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BEFORE THE ARIZONA CORPORATION COMMISSION

Arizona Corporation Commission

COMMISSIONERS

DOCKETED

TOM FORESE— Chairman
BOB BURNS
DOUG LITTLE
ANDY TOBIN
BOYD DUNN

MAR 21 2017

DOCKETED BY
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IN THE MATTER OF THE APPLICATION OF
ARIZONA PUBLIC SERVICE COMPANY
FOR A HEARING TO DETERMINE THE
FAIR VALUE OF THE UTILITY PROPERTY
OF THE COMPANY FOR RATEMAKING
PURPOSES, TO FIX A JUST AND
REASONABLE RATE OF RETURN
THEREON, TO APPROVE RATE
SCHEDULES DESIGNED TO DEVELOP
SUCH RETURN.

DOCKET NO. E-01345A-16-0036

IN THE MATTER OF FUEL AND
PURCHASED POWER PROCUREMENT
AUDITS FOR ARIZONA PUBLIC SERVICE
COMPANY.

DOCKET NO. E-01345A-16-0123

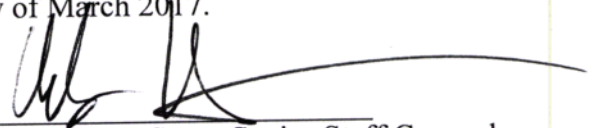
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TESTIMONY OF DENNIS J. SHUMAKER

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The Utilities Division ("Staff") of the Arizona Corporation Commission ("Commission") hereby files the Redacted Direct Testimony of Dennis J. Shumaker in the above-captioned Dockets.

The Confidential information contained in Dennis J. Shumaker's Testimony will be provided under seal to the Commissioners, their Policy Advisors, the assigned Administrative Law Judge, and to Arizona Public Service Company ("Company"). Staff will also provide the Confidential information contained in Dennis J. Shumaker's Testimony to those parties who have executed a Protective Agreement in this case.

RESPECTFULLY SUBMITTED this 21st day of March 2017.


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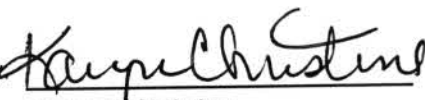
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BEFORE THE ARIZONA CORPORATION COMMISSION

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Commissioner
DOUG LITTLE
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ANDY TOBIN
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BOYD DUNN
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IN THE MATTER OF THE APPLICATION OF) DOCKET NO. E-01345A-16-0036
ARIZONA PUBLIC SERVICE COMPANY FOR A)
HEARING TO DETERMINE THE FAIR VALUE)
OF THE UTILITY PROPERTY OF THE)
COMPANY FOR RATEMAKING PURPOSES,)
TO FIX A JUST AND REASONABLE RATE OF)
RETURN THEREON, AND TO APPROVE RATE)
SCHEDULES DESIGNED TO DEVELOP)
SUCH RETURN)

IN THE MATTER OF FUEL AND PURCHASED) DOCKET NO. E-01345A-16-0123
POWER PROCUREMENT AUDITS FOR)
ARIZONA PUBLIC SERVICE COMPANY)
_____)

DIRECT
TESTIMONY
OF
DENNIS J. SCHUMAKER
ON BEHALF OF UTILITIES DIVISION STAFF
ARIZONA CORPORATION COMMISSION

MARCH 21, 2017

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1 **INTRODUCTION**

2 **Q. Please state your name, occupation, and business address.**

3 A. My name is Dennis J. Schumaker. I am a management consultant and one of the officers and
4 owners of Schumaker & Company. My address is 3101 Walnut Ridge Drive, Ann Arbor,
5 Michigan 48103. I appear in this case as a witness on behalf of the Arizona Corporation
6 Commission Staff.

7
8 **Q. Please provide your background and qualifications for testimony in this proceeding.**

9 A. I have over 35 years of management consulting experience, primarily in the utilities industry.
10 I have substantial experience with all aspects of power plant operations and maintenance,
11 fuels management, and fuels accounting. I was previously a mechanical/nuclear design
12 engineer with Bechtel Corporation prior to entering management consulting. I am a Certified
13 Management Consultant (CMC®), a Project Management Professional (PMP®), and a
14 Microsoft Certified Systems Engineer (MCSE®) and have a Bachelor of Mechanical
15 Engineering and a Master of Science in Nuclear Engineering from the Ohio State University,
16 and a Master of Business Administration from the University of Michigan. I have attached
17 my resume as Exhibit A, which contains a summary of my professional experience.

18
19 **Q. What is the purpose of this testimony?**

20 A. The purpose of my testimony is to sponsor the Fuel and Purchased Power Procurement
21 Audit of Arizona Public Service Company ("APS") that Schumaker & Company conducted at
22 the request of the Arizona Corporation Commission Staff ("Staff"). This report is Exhibit B
23 to this testimony.

24

1 **Q. What drove the need to have a fuel and purchased power audit performed?**

2 A. APS's current rate structure contains a Power Supply Adjustor ("PSA") mechanism that
3 permits APS to either credit or recover fuel and purchased power related costs if the actual
4 costs are less than or exceed what had been estimated in the original rate case. Fuel and
5 purchased power costs can change significantly in a short time based on economic conditions
6 and items for which APS has little control. Because these costs can be passed on to the
7 ratepayers without any hearing or extensive examination, it is important that the management
8 processes and the financial accounting of these costs be thorough and correct. By having an
9 outside third party review these items, Staff can assure that these items are being properly
10 managed and the costs are being properly accounted for and that the rates being charged to
11 customers are accurate.

12
13 **Q. Did your audit identify any significant areas of concern?**

14 A. We did not identify any significant areas of concern in either the management activities or
15 financial activities review of APS's fuel and purchased power activities. Nor did we identify
16 any significant areas of concern regarding the plan for administering the PSA mechanism
17 approved for APS by the Arizona Corporation Commission ("ACC" or "Commission") on
18 June 28, 2007, in Decision No. 69663, (amended by the Commission on December 30, 2009,
19 in Decision No. 71448 and further amended by the Commission on May 24, 2012, in
20 Decision No. 73183). Within APS, the PSA is calculated in accordance with Plan of
21 Administration ("POA"), which describes the plan for administering the PSA mechanism.
22 The POA's effective date was February 6, 2013.

23
24 The audit produced six (6) recommendations to improve certain activities regarding,
25 primarily, improvement in documentation of certain processes. The actual recommendation
26 contained in the audit report are shown in Exhibit 1. We have also indicated the

recommendation number, page number in the report, priority, and estimated time-frame to initiate implementation efforts. The details of each recommendation can be found in *Chapter II – Management Review of PSA Costs* and *Chapter III – Financial Review of PSA Costs*, where the subject matter is evaluated.

Exhibit 1
Summary of Recommendations

	Description	Page	Implementation	
			Priority	Initiation Time Frame
II-1	Perform a study to determine if changes can be made to the coal supply chain to yield some plant efficiencies. (Refer to Finding II-2.)	13	High	0-6 Months
III-1	Improve spreadsheet usage and associated references and cross-references on how used. (Refer to Finding III-1)	52	Medium	0-12 Months
III-2	Have internal or external auditors audit PSA filings, as they have yet to address PSA filing procedures. (Refer to Finding III-5.)	52	Medium	0-12 Months
III-3	Incorporate more detailed implementation steps, including sample screen prints, in Monthly PSA Filings documentation, plus risk management documentation, which should be reviewed and modified, as necessary, at least annually. (Refer to Finding III-6, Finding III-7, and Finding III-10.)	52	Medium	0-6 Months
III-4	Develop formal written documentation for supplemental fuel charges or refunds. (Refer to Finding III-8.)	53	Low	0-6 Months
III-5	When a counterparty vetting shows that it is overexposed, some system configuration updates could be made. (Refer to Finding III-11.)	53	Medium	0-12 Months

To assist APS management in developing implementation plans, each recommendation has been assigned a priority of “high,” “medium,” or “low” according to the following criteria:

- *High* – Designated recommendations are high priority because of their importance and urgency. These represent significant benefit potential, major improvements to service, or substantial improvements to methods or procedures.

- 1 • *Medium* – Designated recommendations are of medium priority. In some instances,
2 the implementation of these recommendations is expected to provide moderate
3 improvements in profitability of operations, or management methods and
4 performance. In other instances, implementation may provide significant longer-term
5 benefits, which are less predictable.
6
- 7 • *Low* – Designated recommendations reflect a lower priority. In many instances, they
8 should be studied further or implemented sometime during the next few years.
9 Potential benefits are perceived to be either modest or difficult to measure.
10

11 **Q. Does this conclude Staff's Direct Testimony?**

12 A. Yes, it does.

Schumaker & Company



**Exhibit A
Final Report**

**IN THE MATTER OF THE
FUEL AND PURCHASED POWER PROCUREMENT AUDIT FOR
ARIZONA PUBLIC SERVICE COMPANY**

(DOCKET NO. E-01345A-16-0123)

**Schumaker and Company, Inc.
3101 Walnut Ridge Drive, Ann Arbor, MI 48103-2195**

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I. Executive Summary

Arizona Public Service Company (APS) is an electric generation, transmission, and distribution company with service territory in the Phoenix metropolitan area and throughout the State of Arizona. APS is a subsidiary of Pinnacle West Capital Corporation (PWCC). As of December 31, 2015, APS was serving approximately 1.2 million customers in various counties in Arizona. Pinnacle West Capital Corporation owns all of the outstanding common stock of APS.

A. Background

APS's current rates became effective July 1, 2012, pursuant to Decision No. 73183. The decision resulted in a total revenue requirement increase of zero dollars. This amount is comprised of (1) a non-fuel base rate increase of \$116.3 million, which includes providing for a return on plant that is in service as of March 31, 2012 (Post-Test Year Plant); (2) a fuel base rate decrease of \$153.1 million; and (3) a transfer of cost recovery from the Renewable Energy Surcharge (RES) to base rates.

The decision approved the Settlement Agreement dated January 6, 2012, whose terms included:

- ◆ A 0% base rate impact
 - ◆ A four-year rate case stay out, in which APS agreed not to raise base rates prior to July 1, 2016 as a result of any new general rate case filing
 - ◆ A Lost Fixed Cost Recovery mechanism
 - ◆ Treatment of Four Corners acquisition
 - ◆ An authorized ROE of 10.0%
 - ◆ Post-test year plant through March 31, 2012
 - ◆ Deferral of property taxes above or below a 2010 test year level caused by changes to Arizona property tax rate
 - ◆ Removal of the Power Supply Adjustor (PSA) 90/10 sharing provision
 - ◆ Modifications to the Environmental Improvement Surcharge and Transmission Cost Adjustor
 - ◆ An experimental buy-through (AG-1) rate for large commercial and industrial (C&I) customers
 - ◆ An expanded low income bill assistance program
 - ◆ A new line extension policy
-

B. Scope of Work

The scope of work associated with Fuel and Purchased Power Procurement Audit was as follows:



1. Identify the utility's authorized decision makers, up to the Board level, who approve fuel and purchased power procurement policies and/or who are authorized to approve procurement transactions. Provide the names of the individuals.
2. For the test year period, audit the fuel and purchased power costs that APS includes within its PSA.
3. Determine APS's overall fuel and purchased power procurement policy, providing commentary on the effectiveness or the sufficiency of the goals and strategies.
4. Review and report significant plant outages other than outages.
5. Determine if there have been declines in operating availability, equivalent availability, or capacity factors of the non-nuclear plants owned by APS and, if so, determine any impact of such decline on ratepayers.
6. Conduct on-site inspections of at least two of APS's non-nuclear generating stations and report findings, conclusions and recommendations regarding APS's fuel handling, quality control (i.e. weighing sampling, scale calibrations, etc.), inventory surveying methodologies and results, performance monitoring (i.e. heat rate), and maintenance.
7. Review and analyze the system simulation model(s) APS uses to develop forecasts of fuel and purchased power volume requirements.
8. Review and analyze the model used by day-ahead traders to determine the correct dispatch of resources, etc.
9. Review a representative sample of APS's fuel and purchased power contracts for reasonableness and for compliance with the terms and conditions.
10. Review APS's use of fuel and purchased power hedging.
11. Review APS's off-system sales in 2014, 2015 and through the most recent date for which information is available.
12. Review all internal and external audit reports on the procurement of fuel and purchased power for the test year and the two prior calendar years. Determine if problems identified in the reports have been addressed by APS.
13. Prepare a report including the results of the analysis described above and containing supported conclusions and recommendations.
14. Prepare expert testimony as required.

GENERAL REQUIREMENTS APPLICABLE TO ALL WORK ELEMENTS

1. Attend meetings in person or via teleconference as requested by Staff.
2. Prepare and submit data requests necessary for the analysis and prepare responses to data requests served on Staff.
3. Read and analyze all testimony, schedules and data responses submitted by APS and all other parties to this docket.
4. Prepare expert testimony as required and scheduled by the Procedural Order and Staff.
5. Coordinate testimony with Staff and other Consultants to ensure that all recommendations are consistent among Staff witnesses.
6. Rebut the assertions of APS and intervenors with which Staff disagrees.
7. Appear and testify at the evidentiary hearing regarding this matter.
8. Assist the Commission's Legal Division with the preparation of cross examination questions.

9. Assist the Commission's Legal Division with the preparation of the legal brief.
10. Review the Recommended Opinion and Order issued by the Hearing Division in this case and evaluate issues for potential exceptions or rehearing.
11. If requested, appear at and respond to Commissioners' questions at Open Meeting.
12. Assist in evaluation of filings and actions made in compliance with the Commission Decision that is ultimately issued in this case.

This project included an audit of APS fuel clause filings and APS's policies, practices, procedures, rules, accounting practices, and cost allocations. Schumaker & Company consultants reviewed support documentation used to prepare APS's filings and assess current practices and recommend remedial actions, where appropriate. During the project, we accessed and utilized information from other outside reviews and audits and looked at and review the reports, audits, analyses, and opinions of third party entities, agencies, and auditors who have reviewed relevant aspects of APS's business operations during the planning and analysis phases of their work.

Schumaker & Company's approach was in accordance with the U.S. General Accountability Office (GAO) generally accepted government auditing standards (GAGAS) in the United States of America (commonly referred to as the "Yellow Book") and generally accepted audit standards (GAAS) in the United States of America. This audit addressed whether APS's fuel and purchase power policies and practices are consistent with generally accepted practices in the electric utility industry and assured that electric power is generated and delivered at the lowest reasonable cost and that costs are accurately recorded.

- ◆ All cost elements of APS's fuel clause will be audited and reviewed for accuracy and compliance to ensure that only appropriate costs are being recovered from retail ratepayers.
- ◆ APS's calculation of the fuel clause is accurate and the costs included in the fuel clause include only allowed costs.
- ◆ APS's current accounting and internal control policies, management practices, and operational procedures as they pertain to APS's administration of the fuel clause are effective and meet related requirements.

The major elements of the utility fuel clause were reviewed to ensure that reasonable and accurate costs are being recovered from retail ratepayers. Schumaker & Company reviewed APS practices, policies, procedures, and compliance with regulations on all major components of fuel costs included in the fuel clause.

The two major review sections in our report include the following:

Management Review

- ◆ Coal costs and plant operations
- ◆ Gas for electric power production
- ◆ Nuclear fuel expense
- ◆ Purchased power expense and sales for resale



Financial Review

- ◆ Fuel clause computations
- ◆ Fuel clause related policies, procedures, rules, cost allocations, and manuals, etc.

C. Summary of Recommendations

The audit produced six (6) recommendations, which are contained in this report. The actual recommendation statements contained in the audit report are shown in *Exhibit I-1*. We have also indicated the recommendation number, page number in the report, priority, and estimated time-frame to initiate implementation efforts. The details of each recommendation can be found in *Chapter II – Management Review of PSA Costs* and *Chapter III – Financial Review of PSA Costs*, where the subject matter is evaluated.

Exhibit I-1
Summary of Recommendations

	Description	Page	Implementation	
			Priority	Initiation Time Frame
II-1	Perform a study to determine if changes can be made to the coal supply chain to yield some plant efficiencies. (Refer to Finding II-2.)	13	High	0-6 Months
III-1	Improve spreadsheet usage and associated references and cross-references on how used. (Refer to Finding III-1)	52	Medium	0-12 Months
III-2	Have internal or external auditors audit PSA filings, as they have yet to address PSA filing procedures. (Refer to Finding III-5.)	52	Medium	0-12 Months
III-3	Incorporate more detailed implementation steps, including sample screen prints, in Monthly PSA Filings documentation, plus risk management documentation, which should be reviewed and modified, as necessary, at least annually. (Refer to Finding III-6, Finding III-7, and Finding III-10.)	52	Medium	0-6 Months
III-4	Develop formal written documentation for supplemental fuel charges or refunds. (Refer to Finding III-8.)	53	Low	0-6 Months
III-5	When a counterparty vetting shows that it is overexposed, some system configuration updates could be made. (Refer to Finding III-11.)	53	Medium	0-12 Months

To assist Arizona Public Service management in developing implementation plans, each recommendation has been assigned a priority of “high,” “medium,” or “low” according to the following criteria:

- ◆ *High* – Designated recommendations are high priority because of their importance and urgency. These represent significant benefit potential, major improvements to service, or substantial improvements to methods or procedures.
- ◆ *Medium* – Designated recommendations are of medium priority. In some instances, the implementation of these recommendations is expected to provide moderate improvements in profitability of operations, or management methods and performance. In other instances, implementation may provide significant longer-term benefits, which are less predictable.
- ◆ *Low* – Designated recommendations reflect a lower priority. In many instances, they should be studied further or implemented sometime during the next few years. Potential benefits are perceived to be either modest or difficult to measure.



II. Management Review of PSA Costs

A. Power Generation Background

APS has a total generation capability of 6,184 MW, which consists of:¹

- ◆ Palo Verde Nuclear Generating Station (Palo Verde) comprises 1,146 MW or 18.53%;
- ◆ Natural gas generation comprises 3,109 MW or 50.27%;
- ◆ Coal generation comprises 1,672 MW or 27.04%;
- ◆ Oil generation comprises 70 MW or 1.33%.

Plus the remaining 187 MW (3.03%) of generation is solar.

Generation fuel sources is summarized in *Exhibit II-1*.²

Exhibit II-1
Generation Fuel Sources
as of October 30, 2016

	Capacity	% of Fossil	% of Total
Gas	3,109,000	64.09%	50.27%
Coal	1,672,200	34.47%	27.04%
Oil	70,000	1.44%	1.13%
FOSSIL	4,851,200	100.00%	78.44%
Nuclear*	1,145,667		18.53%
Solar	187,392		3.03%
TOTAL OWNED	6,184,259		100.00%

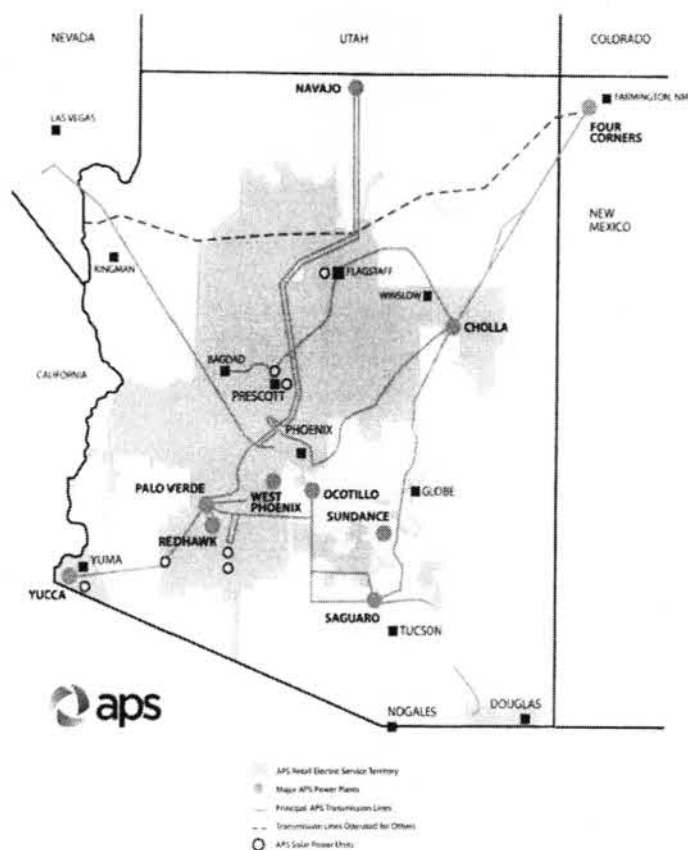
* PV U1	1,311	MW
PV U2	1,314	MW
PV U3	1,312	MW
	<u>3,937</u>	MW * .291 = 1,145.667 MW

Source: Information Response 6

The coal units are located in the north and eastern parts of Arizona or in northwest New Mexico, near to the source of coal, and the gas plants are located nearer to Phoenix on interstate pipelines – as shown in *Exhibit II-2*. As can be seen in *Exhibit II-3*, several coal and gas/oil facilities have been retired in recent years (2013 & 2015) due to environmental issues and as solar and natural gas generation has become more economic, especially with respect to combined cycle natural gas plants. The units with the highest annual capacity factors are the nuclear and coal units, although some coal units annual capacity factors have decreased from that of a typical base load unit. APS Solar photovoltaic (PV) generation has grown over the last several years, although its annual capacity factor is rarely over 40%, the sun does not shine at night.



Exhibit II-2
Major Power Generation Facilities
as of October 30, 2016



Source: Information Response 6

Exhibit II-3
APS Nuclear and Fossil Generation
as of October 30, 2016

Unit Name	Type	Date in Service	Fuel	Ownership	Net Maximum Capacity (MW)	APS Share (%)	Capacity Owned by APS (MW)	Other Information
YUCCA								
ST 1	Steam	03/04/1959	Gas/Oil	ID	75	0	0	Owner: ID Operator: APS
CT 1	C. Turbine	07/01/1971	Gas/Oil	APS	19/19	100	19/19	Capacity: Natural gas / Oil
CT 2	C. Turbine	07/01/1971	Gas/Oil	APS	19/19	100	19/19	Capacity: Natural gas / Oil
CT 3	C. Turbine	06/20/1973	Gas/Oil	APS	55/54	100	55/54	Capacity: Natural gas / Oil
CT 4	C. Turbine	07/09/1974	Oil	APS	54	100	54	
CT 5	C. Turbine	06/02/2008	Gas	APS	48	100	48	COD June 2, 2008
CT 6	C. Turbine	06/23/2008	Gas	APS	48	100	48	COD June 23, 2008
CT 21	C. Turbine	12/02/1978	Oil	ID	22	0	0	Owner: ID Operator: APS
DOUGLAS								
CT 1	C. Turbine	05/21/1972	Oil	APS	16	100	16	
SAGUARO								
ST 1	Steam	07/01/1954	Gas/Oil	APS				Retired June 30, 2013
ST 2	Steam	06/01/1955	Gas/Oil	APS				Retired June 30, 2013
CT 1	C. Turbine	05/16/1972	Gas/Oil	APS	55/54	100	55/54	Capacity: Natural gas / Oil
CT 2	C. Turbine	07/30/1973	Gas/Oil	APS	55/54	100	55/54	Capacity: Natural gas / Oil
CT 3	C. Turbine	07/01/2002	Gas	APS	79	100	79	PWEC trsf to APS 08/01/05
OCOTILLO								
ST 1	Steam	06/01/1960	Gas	APS	110	100	110	
ST 2	Steam	03/01/1960	Gas	APS	110	100	110	
CT 1	C. Turbine	05/27/1972	Gas	APS	55	100	55	
CT 2	C. Turbine	07/13/1973	Gas	APS	55	100	55	
WEST PHOENIX								
CT 1	C. Turbine	05/30/1972	Gas	APS	55	100	55	
CT 2	C. Turbine	07/13/1973	Gas	APS	55	100	55	
CC 1	C. Cycle	06/24/1976	Gas	APS	88	100	88	Upated 3MW - July 1,2009
CC 2	C. Cycle	06/24/1976	Gas	APS	88	100	88	Upated 3MW - July 1,2009
CC 3	C. Cycle	06/24/1976	Gas	APS	88	100	88	Upated 3MW - July 1,2009
CC 4	C. Cycle	06/01/2001	Gas	APS	117	100	117	PWEC trsf to APS 08/01/05
CC 5	C. Cycle	08/01/2003	Gas	APS	506	100	506	PWEC trsf to APS 08/01/05
REDHAWK								
CC 1	C. Cycle	07/01/2002	Gas	APS	492	100	492	PWEC trsf to APS 08/01/05
CC 2	C. Cycle	07/01/2002	Gas	APS	492	100	492	PWEC trsf to APS 08/01/05
CHOLLA								
Unit 1	Steam	05/01/1962	Coal	APS	116	100	116	Upated 6MW - July 1,2009
Unit 2	Steam	06/01/1978	Coal	APS				Retired October 1, 2015
Unit 3	Steam	05/15/1980	Coal	APS	271	100	271	
Unit 4	Steam	06/05/1981	Coal	PAC	380	0	0	Owner: PAC Oper: APS 7/16/91
FOUR CORNERS								
Unit 1	Steam	05/10/1963	Coal	APS				Retired December 30, 2013
Unit 2	Steam	06/17/1963	Coal	APS				Retired December 30, 2013
Unit 3	Steam	08/31/1964	Coal	APS				Retired December 30, 2013
Unit 4	Steam	07/01/1969	Coal	APS-SRP-PNM	770	63	485.1	Ownership Change - December 30, 2013
Unit 5	Steam	07/01/1970	Coal	TEP-EPE	770	63	485.1	Ownership Change - December 30, 2013
NAVAJO								
Unit 1	Steam	01/01/1974	Coal	APS-SRP-NPC	750	14	105	Operator: SRP
Unit 2	Steam	01/01/1975	Coal	U.S. -TEP	750	14	105	Operator: SRP
Unit 3	Steam	01/01/1976	Coal	LADWP	750	14	105	Operator: SRP
PALO VERDE								
Unit 1	Steam	02/13/1986	Uranium	APS-SRP-EPE	1311/1333	29.1	381.5/387.9	Capacity: MDC / DER
Unit 2	Steam	09/22/1986	Uranium	SCE-PNM-SCP	1314/1336	29.1	382.4/388.8	Capacity: MDC / DER
Unit 3	Steam	01/07/1988	Uranium	LADWP	1312/1339	29.1	381.8/389.6	Capacity: MDC / DER - REV 1/1/09
SUNDANCE								
10 Units	C. Turbine	07/17/2002	Gas	APS	420 (42 EACH)	100	420	Purch 5/15/05 -WAPA wheeled

Source: Information Response 6



APS solar generation is shown in *Exhibit II-4*.

Exhibit II-4
APS Solar Generation
as of October 30, 2016

Unit Name	Year in Service	Fuel	Ownership	AC Capacity (kW)	APS Share (%)	Capacity Owned by APS (kW)
Luke Air Force Base	09/18/2015	Solar	APS	10,000.0	100	10,000.0
Desert Star	09/18/2015	Solar	APS	10,000.0	100	10,000.0
Gila Bend	10/17/2014	Solar	APS	32,000.0	100	32,000.0
Foothills- Phase 1	04/15/2013	Solar	APS	17,000.0	100	17,000.0
Foothills- Phase 2	12/31/2013	Solar	APS	18,000.0	100	18,000.0
Chino Valley	12/27/2012	Solar	APS	19,000.0	100	19,000.0
Hyder I - Phase 1	11/11/2011	Solar	APS	11,000.0	100	11,000.0
Hyder I - Phase 2	02/03/2012	Solar	APS	5,000.0	100	5,000.0
Hyder II	12/17/2013	Solar	APS	14,000.0	100	14,000.0
Cotton Center	10/24/2011	Solar	APS	17,000.0	100	17,000.0
Paloma	09/12/2011	Solar	APS	17,000.0	100	17,000.0
Prescott Airport	2001 - 2012	Solar	APS	2,898.8	100	2,898.8
Scottsdale	1999 - 2003	Solar	APS	285.8	100	285.8
Gilbert	2001	Solar	APS	115.2	100	115.2
Yuma	2002 - 2005	Solar	APS	165.9	100	165.9
STAR	1998 - 2015	Solar	APS	281.5	100	281.5
Flagstaff Service Center	1997 - 2001	Solar	APS	75.6	100	75.6
Doney Park Site	2012	Solar	APS	478.5	100	478.5
Glendale Airport	1999 - 2001	Solar	APS	71.7	100	71.7
Phoenix ADEQ Parking	1998 - 2003	Solar	APS	83.3	100	83.3
Chase Field	2011	Solar	APS	63.2	100	63.2
US Airways Center	2011	Solar	APS	182.0	100	182.0
APS Solar-Schools (Statewide)	2012-2013	Solar	APS	12,638.1	100	12,638.1
TOTAL CONNECTED TO GRID (A)				187,339.6		187,339.6
(A) Does not include Flagstaff Community Power Project (375 kW) or Solar Partner Program (3,044 kW)						
Carol Spring Mountain	1996	Solar	APS	29.0	100	29.0
Gray Wolf Landfill	2002	Solar	APS	23.8	100	23.8
TOTAL OFF GRID				52.8		52.8
Red Rock (Solar Trough)	2005	Solar	APS	Retired 04/30/13	100	Retired 04/30/13

Source: Information Response 6

Schumaker & Company consultants visited and reviewed the operations at one coal generating station and one gas generating station. The results of these reviews are discussed in the following sections.

B. Task 1: Coal Costs and Plant Operations

RFP Scope Callouts

The minimum tasks to be performed in the area of Coal Costs include the following:

- ◆ Review APS's policies and practices of monitoring, auditing and reviewing the coal costs in a manner that assures that electric power is generated and delivered at the lowest reasonable cost. Document current delivery and acceptance practices related to incurring fuel charges including transportation, handling, and other related costs.
- ◆ Assess whether any APS coal contract would reasonably have been expected to provide a fuel source that would enable electric power to be generated at the lowest reasonable cost given the circumstances, available options, and information known at the time of contracting.
- ◆ Review and evaluate coal costs and charges (both direct and indirect) to determine if costs charged to APS are proper.

Cholla Supply Chain Review

Schumaker & Company consultants selected the Cholla Plant for an on-site review of fuel handling and plant operations. The Cholla Plant is a four-unit facility (with one unit being retired in 2015) located near Winslow, Arizona. The units are shown in *Exhibit II-5*.³

Exhibit II-5
Cholla Generating Station
as of September 30, 2016

	In Service	Book Life	MW Capacity	Comments
Unit 1	1962	2028	116	
Unit 2	1978	Retired 10/15	260	
Unit 3	1980	2035	271	
Unit 4	1981	n/a	414	Owned by PacificCorp, Operated By APS

Source: Information Response 6

Coal is received at the plant from the EL Segundo mine, which is located 184 rail miles from the plant in New Mexico. The coal is crushed at the mine and some blending might be performed prior to being loaded into 100 ton railcars for delivery to the plant. The coal has a targeted 9,200 Btu per pound requirement in accordance with the coal contract with Peabody CoalSales, and there are premiums and penalties associated with the Btu target. Two sets of 128-car trains are operated by Burlington Northern Santa Fe (BNSF) railroad, and coal deliveries are scheduled by Fuel Supply to meet the expected generation needs. Each railcar is weighed at the mine, and APS pays both tonnage delivered and railroad cost based on those weights, as further specified below:⁴

- ◆ Pursuant to the executed contract, APS purchases the coal (FOB- Freight On Board) mine from Peabody CoalSales, LLC.
- ◆ Coal is officially weighed at the mine, and both Cholla (APS/PacificCorp) and BNSF Rail accept the mine's certified scales for the weighing of coal.



- ◆ The mine scales are certified in the spring and fall of each year by the New Mexico Department of Agriculture (CSA Article 7, 7.4 Scale Testing)
- ◆ Mine scales are sealed. If seals are ever broken, a recertification test is triggered (similar to certified pump seals at a gas station gas pump)
- ◆ Coal customers may attend the bi-annual scale testing, and APS has done this in the past.

Coal cars are placed into a rail siding where APS personnel reposition them for the coal unloading. A railcar is positioned over unloading chutes and the bottom dump doors are opened to empty the railcars. It takes about 3-4 minutes to dump a car. There are belt scales at the Cholla Plant which are used to meter the coal tonnage from unloading to the units or the reclaim pile. These coal belt meters can be used to measure the coal obtained from each railcar for comparison to the railroad/mine manifest. The coal belt meters can trigger a belt scale preventative when there exists a 3% deviation between the mine manifest weights and the Cholla belt meter reads. The Cholla Plant can turn a 128-car train in as short as 16 hours. There are demurrage charges that can arise at something like 24 hours but APS has not experienced any demurrage charges. Ideally, the Cholla Plant strives to move the coal from the railcar directly into the plant to avoid stack out and reclaim activities.⁵

As the railcars are unloaded, the coal moves over the belt scales and is either moved through a coal crusher and into a specific unit in the plant or stacked out to the coal pile. As the coal is unloaded, coal samples are taken which can be sent to an outside laboratory for testing (BTU content, ash, sulfur, etc.) for verification of samples taken at the mine as the railcars are loaded.⁶

APS receives monthly invoices from both BNSF and Peabody CoalSales, LLC. BNSF bills for each railcar moved based on the mine tonnage. The railcar manifests are used to verify the invoices prior to being approved for payment. Peabody CoalSales submits two invoices – one for the tonnage delivered in the month and a second invoice which computes the premiums and/or penalties having to do with the coal quality delivered. These invoices are checked against the railroad manifests in generation accounting at the Cholla Plant prior to being approved for payment.⁷

Findings & Conclusions

Finding II-1 **Coal procurement, delivery, and receipt at the Cholla Plant is reasonable and consistent with our industry expectations.**

The way the coal contracts are structured to procure coal via a long-term contract and the delivery arrangement with the railroad meets our expectations. Most coal contracts that we have seen are usually FOB mine with the owners having to arrange transportation and certified mine weights being the measurement for payment. There are sufficient checks and balances built into the invoice approval process to assure only proper payment occurs.⁸

Finding II-2 **There may be opportunities to fine tune coal deliveries at Cholla to minimize coal pile stack out.**

With the change in operation at Cholla, the supply chain and coal inventory levels should be looked at in a formal study in Fuel Supply.⁹

- ◆ The Cholla Plant is living in a definitely different world from when it was first built. Natural gas plants can be competitive with Cholla based on the price of natural gas. When natural gas prices are in the \$3 to \$4 per mcf, natural gas is competitive with Cholla, which translates into less operation of the plant.
- ◆ One unit at Cholla has been retired. Less coal needed at the plant.
- ◆ The train size has been set at 128 cars. If it was smaller could we experience less stack out?

Schumaker & Company has experience with a small plant in Michigan that converted from receiving its coal by rail to receiving coal by truck. The trucks could deliver every day on a schedule that resulted dumping the load directly into the plant greatly minimizing stack out. They achieved significant savings (for them) by changing their supply chain. Although the Cholla Plant is operating in a different environment, there may still be some opportunities to improve the coal supply chain to the plant.

Recommendations

Recommendation II-1 **Perform a study to determine if changes can be made to the coal supply chain to yield some plant efficiencies. (Refer to Finding II-2.)**

The utilization of the Cholla Plant has changed significantly from when it was first built as a base load plant. The plant is being operated more as an intermediate plant where it is being asked to follow load. At the time of the last fuel audit, Cholla was being operated as more of a base load facility, but it appears that the future will be different.

Cholla Fuel Burn

The preceding section got the coal to the Cholla Plant, and establishes the Average Unit Cost (AUC) that through the process of burning the coal impacts the Power Supply Adjustor. The amount of fuel that each unit burns in a month is determined by the Cholla belt meter reads as coal is fed into each unit's silos.¹⁰

Generation Accounting maintains spreadsheets which not only track the coal received, coal burned, and coal stacked out. A running computation of the Average Unit Cost per ton is calculated at the end of each month and it is applied to the coal burned for the month uniformly across all the units.¹¹



The coal burned is determined by the belt meters which are shown in *Exhibit II-6*. Coal can be moved from the Old Track Feeders (rail car dump), the New Track Feeders (a later installed railcar dump), or the Reclaim Pile. The yellow circles highlight the belt meters locations that measure the coal going into a unit's silos. In essence, nothing goes into a unit's silos without being measured.¹²

Exhibit II-6
Cholla Belt Meters
as of September 30, 2016

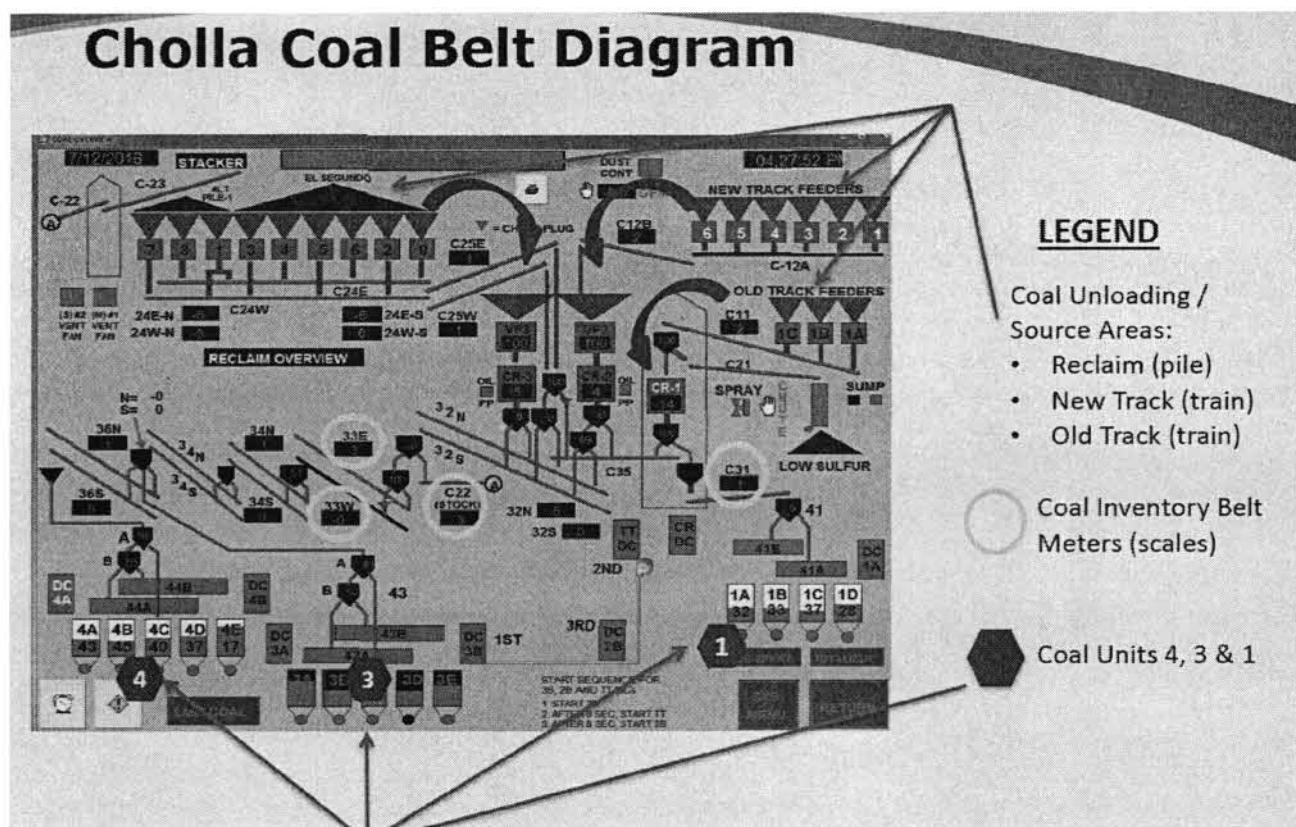


Exhibit II-7
Cholla Fuel Burn Calculation
as of November 30, 2015

	Current Month				Year-to-Date	
	Unit of Meas.	BTU/Unit	Amount Used	BTU/Gen/Hr Rate	Amount Used	BTU/Gen/Hr Rate
Unit 1						
Reg Coal Rec'd & Burned	Tons		0.000		0.000	
Reg Coal Reclaimed	Tons		0.000		0.000	
L/S Coal Rec'd & Burned	Tons		0.000		0.000	
L/S Coal Reclaimed	Tons		0.000		0.000	
Alternative Coal Rec'd & Burned	Tons		0.000		284,417.754	
Alternative Coal Reclaimed	Tons		22,010.197		82,078.548	
Total Coal Burned	Tons	18,461.579	22,010.197	406,343,000.000	366,496.302	6,725,287,000.000
Natural Gas	MCF's	857	56.8	48,700,000	2,037.4	1,757,700,000
Total BTU's				406,391,700.000		6,727,044,700.000
Gross Generation				41,757,800		686,178,700
Gross Heat Rate				9,732		9,804
Net Generation (kwh)				37,514,669		627,044,647
Net Heat Rate				10,833		10,728
Unit 2						
Reg Coal Rec'd & Burned	Tons		0.000		0.000	
Reg Coal Reclaimed	Tons		0.000		0.000	
L/S Coal Rec'd & Burned	Tons		0.000		0.000	
L/S Coal Reclaimed	Tons		0.000		0.000	
Alternative Coal Rec'd & Burned	Tons		0.000		576,734.239	
Alternative Coal Reclaimed	Tons		0.000		83,434.547	
Total Coal Burned	Tons		0.000	-	660,168.786	12,121,549,000.000
Boiler Fuel Oil	Barrels	5,350,926	-	-	2,893	15,360,756,096
Total BTU's				-		12,136,909,756.096
Gross Generation				-		1,229,570,000
Gross Heat Rate				-		9,871
Net Generation (kwh)				-		1,083,575,116
Net Heat Rate				-		11,201
Unit 3						
Reg Coal Rec'd & Burned	Tons		0.000		0.000	
Reg Coal Reclaimed	Tons		0.000		0.000	
L/S Coal Rec'd & Burned	Tons		0.000		0.000	
L/S Coal Reclaimed	Tons		0.000		0.000	
Alternative Coal Rec'd & Burned	Tons		52,227.525		637,682.896	
Alternative Coal Reclaimed	Tons		3,472.990		79,623.964	
Total Coal Burned	Tons	18,192.579	55,700.515	1,013,336,000.000	717,306.860	13,149,275,000.000
Boiler Fuel Oil	Barrels	5,350,926	129	690,269,454	2,573	13,644,341,844
Total BTU's				1,014,026,269.454		13,162,919,341.844
Gross Generation				104,857,000		1,364,978,000
Gross Heat Rate				9,671		9,643
Net Generation (kwh)				94,816,324		1,231,840,032
Net Heat Rate				10,695		10,686

Source: Information Response 20



Exhibit II-8
Generation Accounting Calculation of the Fuel Burn
as of September 30, 2016

		TONS	DOLLARS	AUC	Us
MATERIAL LEDGER BALANCE: C/I #0100-001125	Jul-16	400,386.011	\$15,768,605.56		
TONS ADJUSTMENT					
PLUS: ALTERNATIVE PURCHASED		-	-		
PLUS: ADJUSTMENT COLOWYO BTU AJD		-	-		
PLUS: ADJUSTMENT (See Coal Shipment Schedule)		-	-		
Less: ADJUSTMENT		-	-		
		-	-		
		-	-		
LESS: RECEIVING ADJUSTMENTS- Coal SWAP			-		
TOTAL PURCHASES		-	-		
TOTAL AFTER PURCHASES		400,386.011	\$ 15,768,605.56		
LESS: BURNS BY UNIT AT NEW AUC					
UNIT 1 CHOLLA COAL INVENTORY RECAP					
Alternative 1A Coal		13,977.580	550,486.02		
Alternative 3A Coal			0.00		
		13,977.580	550,486.020		
UNIT 3 CHOLLA COAL INVENTORY RECAP					
Alternative 1A Coal		35,430.774	1,395,387.89		
Alternative 3A Coal			0.00		
		35,430.774	1,395,387.89		
Total Unit 1		13,977.580	550,486.02		
Total Unit 3		35,430.774	1,395,387.89		
TOTAL BURNS		49,408.354	\$ 1,945,873.91		
Cholla Coal Sale To PacifiCorp per Agreement					
MATERIAL LEDGER BALANCE: C/I #0100-001125	Aug-16	350,977.657	\$ 13,822,731.65		

Source: Information Response 30

There is another Excel spreadsheet maintained in Generation Accounting that calculates a cumulative average unit cost (AUC) for a ton of coal that is used to translate the tons burned into the dollars burned from which a general ledger entry can be booked for the month for the fuel burned. Fuel burned includes both the cost of the fuel and the cost of the rail transportation.¹³

Findings & Conclusions

Finding II-3 The fuel burn calculations are reasonable and within industry expectations.

Each spring and fall, a coal pile survey (GPS drive-over) is conducted (by a third party) at Cholla to measure the size of the coal pile. Each fall; a drilled core sample test of the coal pile is (conducted by a third party) to analyze the density of the coal pile. If the GPS survey results has a deviation of $< > 5\%$ from the Cholla coal pile inventory volume, an adjustment is made to the APS coal pile book inventory. The last adjustment was made in 2012 as shown in *Exhibit II-9*.

Exhibit II-9
Coal Pile Inventory Adjustments
as of September 30, 2016

Mikon GPS Survey Results and APS Book Adjustment

Updated: May 4, 2016

Cholla Power Plant
Comparison of Cholla Inventory Tons versus Coal Stockpile Survey Results
(excluding Capitalized Base Amounts)
Survey Date: April 20, 2016

Cholla Power Plant
El Segundo Coal Reclaim (Alt 1)
Jan. 2011 thru May, 2012

(1) Cholla book inventory - April 20, 2016
+/- Adjustments
Adjusted Book Inventory

(2) Coalpile Tons per Mikon GPS Survey
- less Capitalized Base Coalpile
Adjusted Mikon Survey Quantity

Variance (Tons)

(3) Variance (%) - April 20, 2016

El Segundo / Leo Ranch (Alt 1A Pilot)
917,835
-
Adjusted Book Inventory
917,835
880,164
-
Adjusted Mikon Survey Quantity
880,164
Variance (Tons)
37,671
Variance (%) - April 20, 2016
4.104%

Notes:

(1) From 2015, Cholla Coalbook, Volume 6, Line #47, Column D.

(2) From Mikon Coalbook, Volume 6, Line #47, Column D.

(3) Capitalized Base for Alt 1A Pilot was never created and none was booked as such.

(4) Cholla Coalbook Agreement #12 requires an adjustment to the Book inventory if the variance is greater than +/- 5%.

Tons Burned - Alt 1 Reclaim

	Unit 1	Unit 2	Unit 3	Total APS	Unit 4	Total Cholla
January - December 2011	159,654,305	128,554,757	165,877,586	435,884,428	342,615,051	678,600,000
January - May 2012	87,143,211	23,487,364	16,664,636	87,264,531	35,318,851	120,813,000
Total	246,797,516	152,042,121	182,542,222	523,148,959	277,933,902	800,293,000

Percent of Alt 1 Reclaim

	Unit 1	Unit 2	Unit 3	Total APS	Unit 4	Total Cholla
January - December 2011	20.54%	18.97%	24.50%	64.14%	35.60%	100.00%
January - May 2012	43.09%	17.71%	12.57%	73.57%	25.68%	100.00%
Total	24.32%	18.76%	22.57%	69.63%	34.39%	100.00%

Book Inventory - June 6, 2012	778,960.44
Coalpile Tons per Mikon Survey	721,272.00
Survey Difference (Tons)	48,830.44

Historical Survey Results:

	Regular (Mikon)	Alt 1A (ES / LR)	Alt 2 (Spring Creek)	Reg. + Alternative Coalpile	Low Sulfur	Total
Variance (%) - November 9, 2015	N/A	1.998%	N/A	1.998%	N/A	1.998%
Variance (%) - May 5, 2015	N/A	1.839%	N/A	1.839%	N/A	1.839%
Variance (%) - November 12, 2014	N/A	0.802%	N/A	0.802%	N/A	0.802%
Variance (%) - May 5, 2014	N/A	0.474%	N/A	0.474%	N/A	0.474%
Variance (%) - November, 2013 Survey	N/A	-3.725%	N/A	-3.725%	N/A	-3.725%
Variance (%) - June, 2013 Survey	N/A	-1.219%	N/A	-1.219%	N/A	-1.219%
Variance (%) - December, 2012 Survey	N/A	1.505%	N/A	1.505%	N/A	1.505%
Variance (%) - August, 2012 Survey	N/A	0.849%	N/A	0.849%	N/A	0.849%
Variance (%) - June, 2012 Survey	N/A	5.958%	N/A	5.958%	N/A	5.958%
Variance (%) - March, 2012 Survey	N/A	4.879%	N/A	4.879%	-1.499%	4.430%

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	Unit 1	Unit 2	Unit 3	Total APS	Unit 4	Total Cholla
Survey Adj. (Tons) per Unit	11,182,894	8,704,792	10,410,467	30,497,122	15,903,270	46,399,442

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10

Source: Information Response 31

The lack of a need to make adjustments to the coal pile inventory supports the fact that the calculation of the fuel burns at Cholla are reasonably accurate.



Recommendations

None

C. Task 2: Gas for Electric Power Production

The minimum tasks to be performed in the area of Gas for Electric Power Production include the following:

- ◆ Review gas costs passed through the fuel clause for appropriateness.
- ◆ Review and evaluate the adequacy, appropriateness, and impact on the fuel clause of APS's written procedures and policies for natural gas purchases for electric production.
- ◆ Assess the impact on retail ratepayers of APS's sale of natural gas purchased or contracted for usage at its generating plants.
- ◆ Review and analyze the impact on retail ratepayers of purchases and sales of natural gas purchased or contracted for the execution of off system sales.
- ◆ Obtain and understand all rules and processes designed to address and prevent conflicts of interest between utility operations and retail ratepayers and any wholesale transactions.

Redhawk Gas Plant

Schumaker & Company consultants selected the Redhawk Plant for an on-site review of fuel handling and plant operations. The Redhawk Plant is a combined cycle gas plant that was acquired in approximately 2002. It had earlier been built as a merchant plant. The Redhawk Plant has two combined cycle units, each of which are equipped with two combustion turbines and one steam turbine. Each unit can be operated in various configurations as shown in *Exhibit II-10*.¹⁴

Exhibit II-10
Redhawk Plant Unit Configuration (each Unit)
as of September 30, 2016

Configuration	Output
1 Combustion Turbine	75 MW to 110 MW
1 Combustion Turbine X 1 Steam Turbine	125 MW to 250 MW
2 Combustion Turbine X 1 Steam Turbine	250 MW to 500 MW

Source: Interview 9 Redhawk Plant Tour

The plant is staffed with less than 20 people including 5-6 operator and 11 maintenance personnel and supervisors and management. The plant is fed by two interstate natural gas pipelines which are

connected via a mixing system such that the plant's gas source can be switched or modified during plant operation. The combustion turbine can be brought on-line in 15 minutes. The plant can be brought on-line including steam from a cold start in 5 hours and from a hot start in 2 ½ hours. At the time of our review, the incremental costs at Redhawk were cheaper than Cholla due to low price of natural gas. Natural gas for Redhawk is procured in Marketing and Trading and the settlements group handles the back end validation.¹⁵

Findings & Conclusions

Finding II-4 The procurement of natural gas for the Redhawk plant is reasonable and the location of the plant on two natural gas pipelines (which are also pipelines that APS has connected to storage) provide greater operational flexibility.

Natural gas plants are very advantageous given the current price of natural gas in the \$3 to \$4 or under range. They can be started more quickly than a coal plant and are better designed to follow load. Many of the existing coal plants were designed and built to be base load plants. The dual natural gas feeds provide APS with additional benefits in managing its gas supply portfolio.¹⁶

Recommendations

None

D. Task 3: Nuclear Fuel Expense

The minimum tasks to be performed in the area of Nuclear Fuel Expense include the following:

- ◆ Assess whether APS policies and procedures for all aspects of nuclear fuel cost and procurement are adequate and appropriate.
- ◆ Assess APS's practices and procedures related to their review and verification of APS's nuclear fuel charges to APS and recommend any remedial measures that should be taken.

Schumaker & Company consultants have previously reviewed the accounting for fuel burn at Palo Verde. Nuclear fuel is a long lead time procurement with several steps involved in the creation of the nuclear fuel bundles. Fuel costs are accumulated over a many year time frame and those costs are then amortized during the fuel "burning" process. As such, these costs are identified years in advance and do not change much during plant operations and would have little impact on the calculation of fuel adjustments.

Findings & Conclusions

None



Recommendations

None

E. Task 4: Purchased Power Expense and Sales for Resale

The minimum tasks to be performed in the area of Purchased Power Expense and Sales for Resale include the following:

- ◆ Review firm power purchase policies and procedures and determine if long-term firm power purchases are fully utilized in hourly dispatch.
- ◆ Assess whether resource purchases are made when needed and benefit retail ratepayers.
- ◆ Review economic dispatch to determine if it is done in a proper manner utilizing prudent utility practices to minimize production costs through optimal utilization of all resources assuring that jurisdictional load is always served first with the lowest cost available resources. After satisfying jurisdictional customer loads in a given hour, the excess is available to sell. As part of this review, in order to minimize production cost to meet load and losses, does APS economically dispatch all of its resources in the following areas:
 - FERC firm wholesale load
 - Off system sales
 - Trading
- ◆ Review trading practices, policies and procedures and determine if expenses and revenues are properly accounted for and allocated to retail customers fairly. Cost and revenue allocations should also be reviewed as part of this task.
- ◆ Assess whether trading and dispatch processes favor off system sales and shareholder interests to the detriment of retail ratepayers.
- ◆ Assess risk management and credit policies and procedures to ensure practices are in the best interest of the ratepayer and the Utility manages risk exposure.

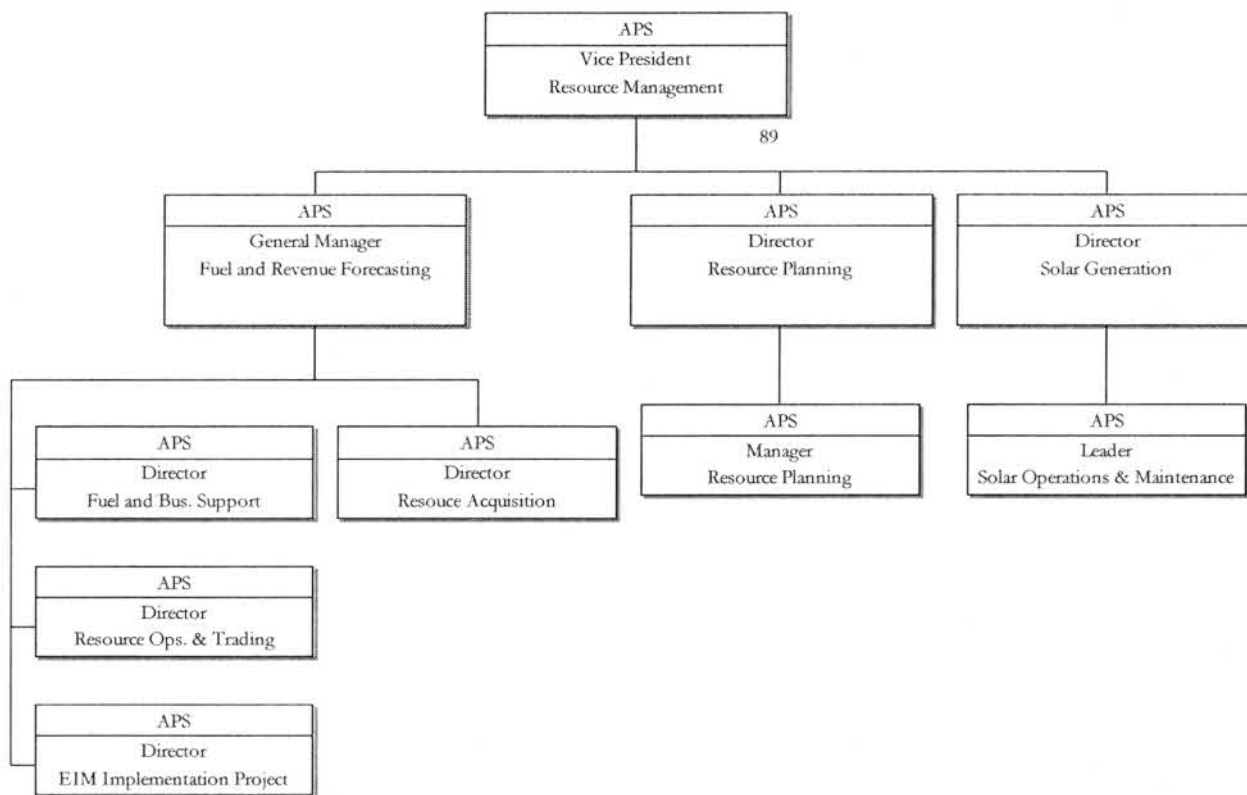
RFP Scope Callouts

- ◆ Assess whether APS's cost control procedures are appropriate and adequate to assure that electric power is generated and purchased at the lowest reasonable cost.
- ◆ Assess whether APS's processes and procedures assure that generally accepted practices in the electric utility industry are considered, appropriately evaluated, and adopted so that electric power is generated and delivered at the lowest reasonable cost.

Resource Management Organization

APS has a Resource Management organization of approximately 89 employees that is responsible to ensure that electric power is generated and purchased at the lowest reasonable cost. This group is organized as shown in *Exhibit II-11*.

Exhibit II-11
Resource Management Group
as of September 30, 2016



Source: Information Response 1

The group is organized into three main groups, specifically:

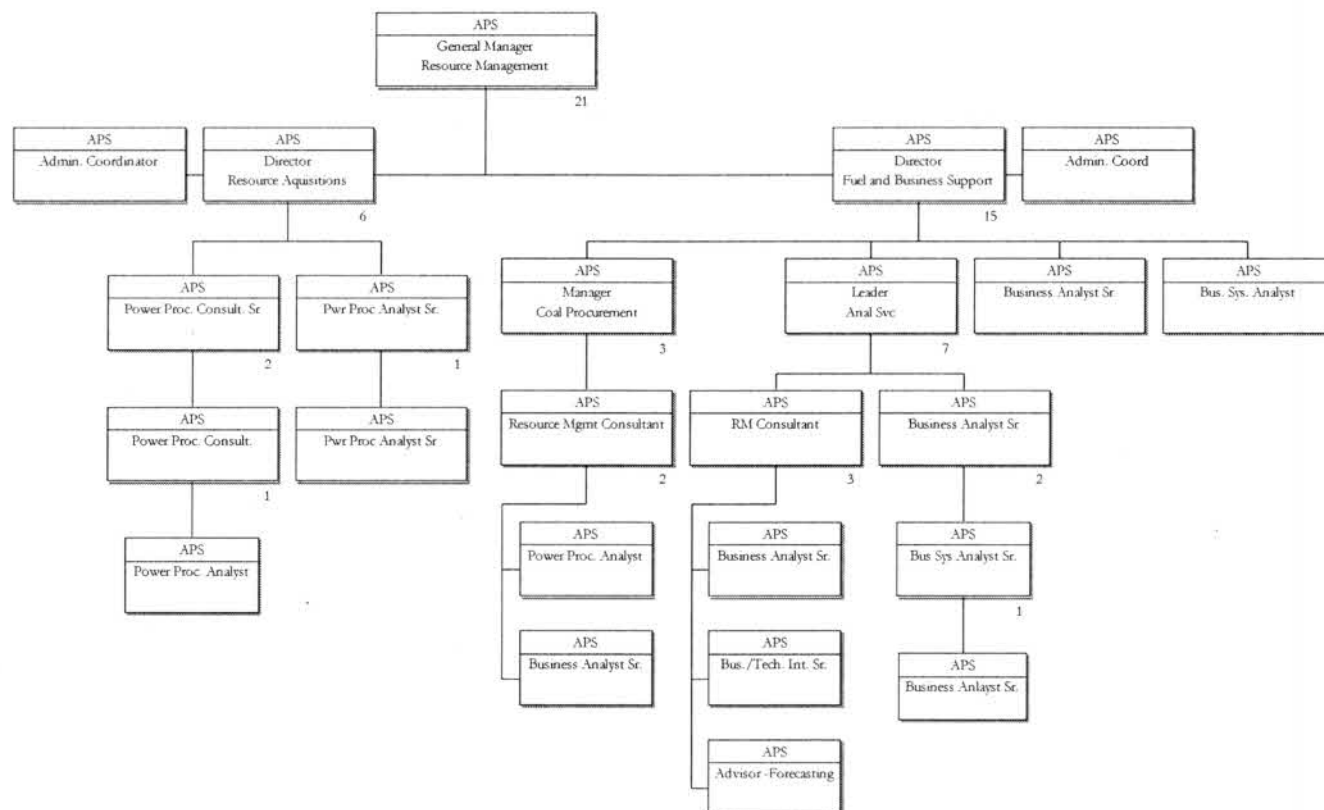
- ◆ Resource Management
- ◆ Resource Planning
- ◆ Solar Generation

However, the Resource Management group contains the Fuel and Business Support group and Resource Operations and Trading group which are most relevant to deciding how resources (generation, purchased power, and electric sales) are deployed to meet system load on a daily basis.¹⁷



The Fuel and Business Support group is organized as shown in *Exhibit II-12*. This group is responsible for the acquisition and management of all longer term power and fuel contracts. In particular, this group has a role in the management of the coal contract for Cholla and the interface with BNSF railroad.¹⁸

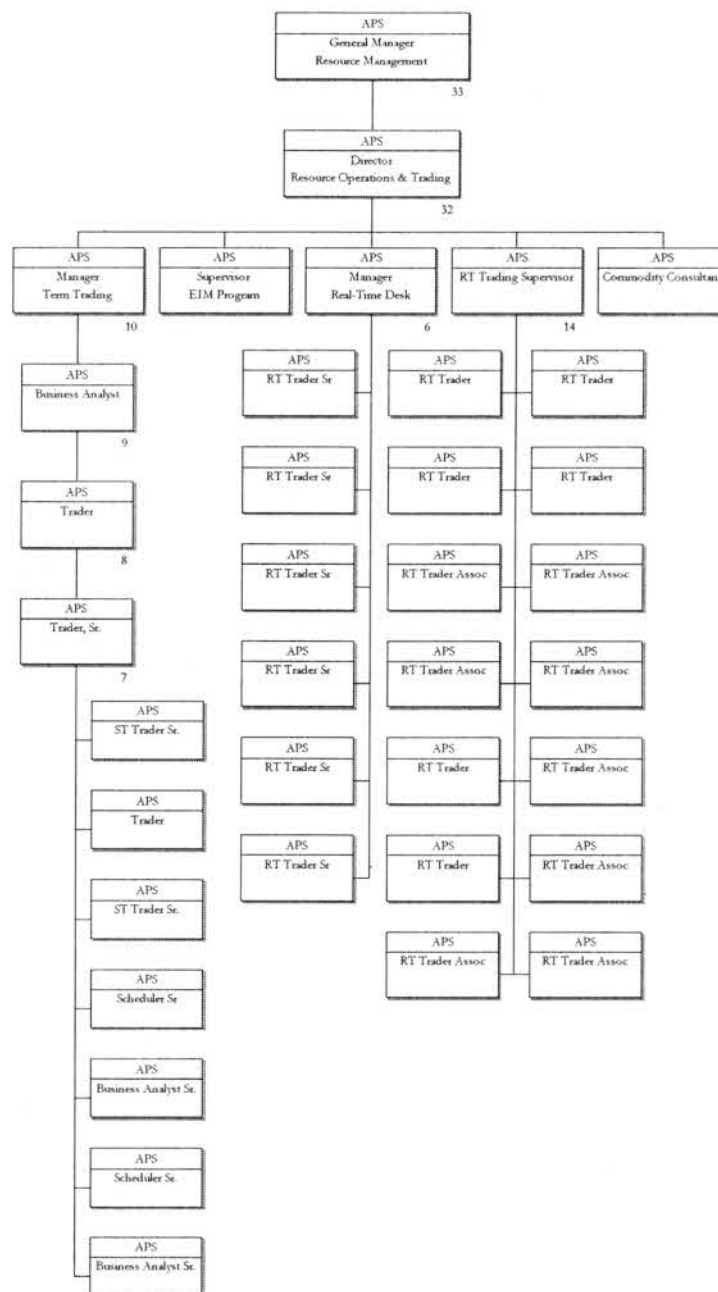
Exhibit II-12
Fuel and Business Support
as of September 30, 2016



Source: Information Response 1

The Resource Operations and Trading group is organized as shown in *Exhibit II-13*. This group is responsible for the real time desk and term traders of electric, gas, transportation, and transmission scheduling as necessary.¹⁹

Exhibit II-13
Resource Operations and Trading Group
as of September 30, 2016



Source: Information Response 1

There are approximately 35 personnel in this group.



Resource Management Systems

The Resource Operations and Trading group is responsible for the day to day dispatch of APS generating units and any real time and day ahead power or gas trading (purchases and sales) of both electricity and natural gas. The decision making tools used in the area include PCI Tools, a commercially off-the-shelf (COTS) software tool, which has been configured for the APS network (generation units, heat rate curves, etc.), which is used to make decisions on a real time and day ahead basis. APS has several neighboring utilities with which it can trade power on an hourly basis and is also connected to the California Independent System Operator (CAISO) with which it can buy and sell power on an hourly and, most recently, a 5 minute basis. The 5 minute power sales started on October 1, 2016 and is handled by the CAISO. APS is able to “bid” power into the CAISO and CAISO elects to take the power on a 5 minute basis. All the settlement processes are handled through the CAISO. Pacific Corp and APS are the two outside (CAISO) utilities participating in the 5 minute market but several other utilities are expected to join the market in the coming years. Although it is too early to tell, APS has already been able to benefit from taking advantage of negative power prices from California during one week in October.

In addition, APS Energy Management System, automatically dispatches almost all APS generating units in response to system load. Gas prices used within both systems are updated on a daily basis and coal and nuclear prices are updated on a monthly basis, as a minimum. All pricing is entered on a replacement cost basis and the software also includes some variable operations and maintenance costs to provide an accurate representation of the incremental costs of electric production. All decision making on power and natural gas on both a real time and day ahead basis is made using the PCI Tools.

APS benefits from having a natural gas storage facility available for its use. The storage facility is located near New Mexico and is connected to both the El Paso and Trans Western pipelines which are the same pipelines that serve many of APS gas generation stations.

Long Term Resource Planning

For long term decision making, APS uses the RTSim Production Cost Simulation Model. RTSim is a production cost model designed to find the optimum unit commitment of a system considering load and market conditions. APS uses RTSim to forecast fuel and purchased power requirements over a one month to 20 year time horizon. RTSim is a generation simulation model written specifically for use by companies with generation which is operating in a market. RTSim will find higher probability, lower risk, market transactions, maintenance schedules, emission compliance strategies and fuel procurement schedules while maintaining reliable, reasonable cost service to the traditional regulated market sector. APS has been using RTSim for over 15 years.

Findings & Conclusions

Finding II-5 **The resource management activities are reasonable and in line with our expectations for the industry.**

Each morning there is a meeting where the plan for the day is discussed with Resource and Trading personnel. The plan for that day was developed the previous day by the day ahead personnel and any modifications of that day's plan is discussed in that meeting along with the latest weather forecast. As might be expected, the actual weather that is experienced on a given day is a prime driver of the actual system electrical demand. The computer tools and practices within Resource and Trading are similar to what would be expected in other similar resource and trading operations at other utilities.

Finding II-6 **APS hedges natural gas and electricity to reduce exposure of energy price volatility to its customers and increase rate stability.**

Although APS hedges natural gas and electricity to reduce certain exposures in actuality APS primarily hedges natural gas. However, since the natural gas is used in generation, you are also essentially hedging electric power.²⁰

APS's hedging program was introduced in the late 1990s as power market instability evolved. By 2003, APS had adopted formal hedging guidelines that set the proportion of its requirements for gas and purchased power for which prices would be fixed and provided coverage extending three years. The current hedging program has been in place since 2005.²¹

The main elements of the current hedge plan are prescribed target hedge levels by specific dates over the three year rolling term. The commodities included in the plan include natural gas, purchased power and natural gas basis differential. Specific percentage hedge levels must be maintained during the rolling period in order to remain compliant. Compliance is independently measured by the APS Risk Control Management department.²²

APS Traders utilize various hedging products to manage the commodity price risk. They hedge with a combination of financial and physical natural gas and electricity contract regularly found in the energy market place. The traders primarily execute transactions on an electronic trading platform such as the Intercontinental Exchange (ICE) or by phone (recorded line).²³

Recommendations

None



Power Plant Operations

APS reports the following information for each power plant on a monthly basis.

- ◆ Availability Factor
- ◆ Equivalent Availability Factor
- ◆ Net Capacity Factor

Findings & Conclusions

Finding II-7 Power plant availabilities are reasonable and within industry expectations.

Our review of these numbers did not identify any significant issues regarding power plant operations. From our review of the Cholla and Redhawk plants, we identified that each of these plants had a maintenance management system in place for managing all maintenance and preventive maintenance activities. The maintenance management system has probably contributed to the good availability of each plant.²⁴

Recommendations

None

III. Financial Review of PSA Costs

This chapter includes both a review of fuel clause computations and APS's fuel clause related policies, procedures, rules, cost allocations and manuals, etc. as summarized below:

Task 5: Fuel Clause Computations

- ◆ Review computation of monthly fuel clause filings and determine their accuracy and documentation of the business process and support.
- ◆ Review compliance with the objectives of a fuel clause which among others are to:
 - Provide for adequate regulatory review of APS's operations under its fuel clause
 - Provide for the stability of utility earning when electric fuel costs and purchased power costs are rising and permit prompt credits to customers when electric fuel costs and purchased power costs are declining
 - Flow through to electricity users the increases and decreases in applicable fuel and purchased power costs per kWh of delivered energy above or below a base cost.
- ◆ Review the fuel clause filings and determine if the following are accurate:
 - Applicable kWh purchases and sales
 - Base fuel and purchased power expense calculations

Task 6: APS's Fuel Clause Related Policies, Procedures, Rules, Cost Allocations and Manuals, etc.

The minimum tasks to be performed in the area of APS's fuel clause related policies, procedures, rules, accounting practices, cost allocations and manuals include the following:

- ◆ Collect all of APS's fuel clause related policies, procedures, rules, cost allocations and manuals, etc. and review, analyze and comment on the adequacy and appropriateness of each of the above from the perspective of retail ratepayers and shareholders.
- ◆ Review APS accounting practices for appropriate generally accepted government audit standards (GAGAS), generally accepted accounting principles (GAAP), and regulatory accounting practices.
- ◆ Review applicable credit dollar limits associated with any type of transaction.
- ◆ Analyze risks of the utility's retail and wholesale operations and transfer of any risk between the two.
- ◆ Collect and review membership, nomination/selection process, responsibilities, duties, authorities, periodicity of meetings and reporting, and chain of command of the applicable executive committees or other oversight/development groups.



A. Background & Perspective

Historical Perspective

Initially an August 18, 2004 settlement agreement and Decision No. 67744 at Docket No. E-01345A-03-0437 resolved issues related to an APS application to increase rates. In *Section IV* of that agreement, it provided for a Power Supply Adjustor (PSA) filing designed to track changes in APS's cost of obtaining power supplies; i.e., the difference of the going forward costs of fuel and purchased power (capped at an annual amount of \$776.2 million) compared to costs embedded in APS's base rates. The decision at that time set the base rate of fuel at \$0.020743 per kWh and the initial adjustor rate at zero, with annual April 1 resets, beginning with 2006.²⁵

Subsequently, the current Plan of Administration (POA) documentation provided by APS during this management audit describes the plan for administering the PSA mechanism approved for APS by the Arizona Corporation Commission (ACC or Commission) on June 28, 2007 in Decision No. 69663, amended by the Commission on December 30, 2009 in Decision No. 71448, and as further amended by the Commission on May 24, 2012 in Decision No. 73183. The POA's effective date was February 6, 2013.²⁶

The PSA now provides for the recovery of fuel and purchased power costs, to the extent that actual fuel and purchased power costs deviate from the amount recovered through APS's base cost of fuel and purchased power (\$0.032071 per kWh) authorized in Decision No. 73183, from May 24, 2012. It also provides for refund or recovery of the net margins from sales of emission allowances, to the extent the actual sales margins deviate from the base rate amount of (\$0.000001) per kWh, which is the result of (2010 net gains from sales of SO₂ allowances of \$21,178) / (2010 test year native load sales of 28,075,248 MWh)/1000, and for recovery of mandated carbon emission costs, when it is economical to incur those costs in making short-term off-system sales. APS indicates that it shall not incur mandatory carbon emission allowance costs unless it passes those costs on to the California entities that are purchasing energy from APS, plus in no event shall APS incur California's carbon emission allowance costs when doing so is not an economical choice for APS's Arizona ratepayers.²⁷

The PSA described uses a forward-looking estimate of fuel and purchased power costs and margins on the sales of emission allowances to set a rate that is then reconciled to actual costs experienced. It includes a limit of \$0.004 per kWh on the amount the PSA rate may change in any one year absent express approval of the Commission. It also provides a mechanism for mid-year rate adjustment in the event that conditions change sufficiently to cause extraordinarily high balances to accrue under application of the PSA. The specific PSA components include:²⁸

- ◆ The *Forward Component*, which recovers or refunds differences between expected PSA year (except for circumstances when the Commission approves new base rates, a PSA year begins on February 1 and ends on the following through January 31 period ~~shall~~ constitute a PSA year) PSA costs and those embedded in base rates.

- ◆ The *Historical Component*, which tracks the differences between the PSA year's actual fuel and purchased power costs and those recovered through the combination of base rates and the Forward Component, and which provides for their recovery during the next PSA year.
- ◆ The *Transition Component*, which provides for:
 - The opportunity to seek mid-year changes in the PSA rate in cases where variances between the anticipated recovery of fuel and purchased power costs for the PSA year under the combination of base rates and the Forward Component become so large as to warrant recovery/refund, should the Commission deem such an adjustment to be appropriate.
 - The tracking of balances resulting from the application of the Transition Components, in order to provide a basis for the refund or recovery of any such balances.

In the event that new base rates become effective on a date other than February 1, the Commission may, at its discretion, adjust any or all of the PSA components to reflect the new base rates. On or before September 30 of each year, APS submits a PSA rate filing, which shall include a calculation of the three components of the proposed PSA rate. This filing is to be accompanied by such supporting information as ACC Staff determines to be required. APS will supplement this filing with Historical Component and Transition Component filings on or before December 31 in order to replace estimated balances with actual balances.²⁹

The allowable PSA costs include fuel and purchased power costs incurred to provide service to retail customers, plus any of the prudent direct costs of contracts used for hedging system fuel and purchased power will be recovered under the PSA. Additionally, the net margins on the sale of emission allowances will also be refunded or recovered through the PSA. The allowable cost components include the following Federal Energy Regulatory Commission (FERC) accounts:³⁰

- ◆ 501 Fuel (Steam)
- ◆ 518 Fuel (Nuclear) less Independent Spent Fuel Storage Installation (ISFSI) regulatory amortization
- ◆ 547 Fuel (Other Production)
- ◆ 555 Purchased Power
- ◆ 565 Wheeling (Transmission of Electricity by Others)
- ◆ 411 O&M (Margins on the Sale of Emission Allowances)
- ◆ 509 Allowances (or any successor FERC account used to record the costs of purchasing carbon emission allowances) based only in California where APS covers costs.

Decision No. 66567 provided APS the ability to recover reasonable and prudent costs associated with customers who have left APS standard offer service, including special contract rates, for a competitive generation supplier and then return to standard offer service. For administrative purposes, customers who were direct access customers since origination of service and request standard offer service would be considered to be returning customers. A direct assignment or special adjustment may be applied that recognizes the cost differential between the power purchases needed to accommodate the returning customer and the power supply cost component of the otherwise applicable standard offer service rate.



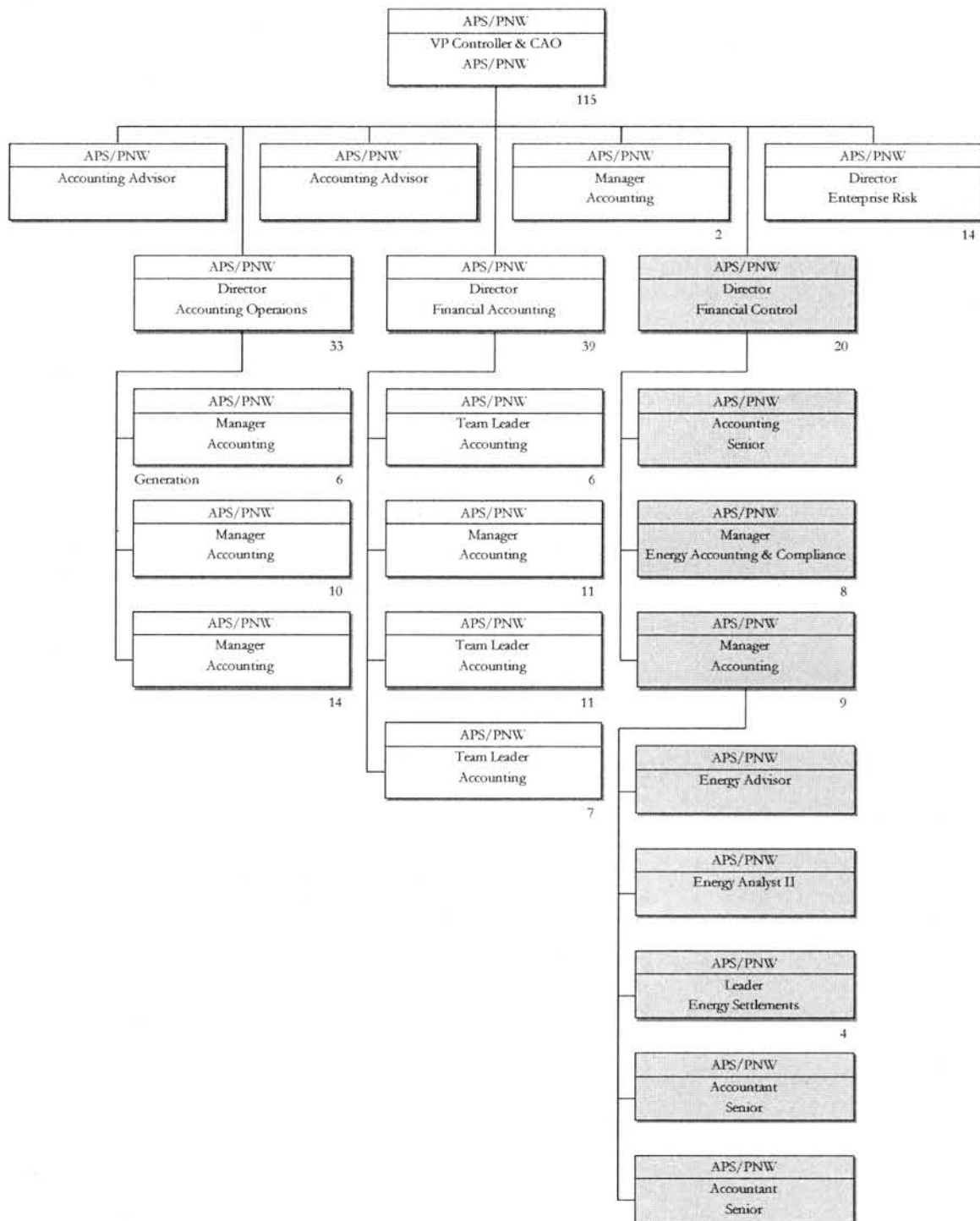
This process is described in the Returning Customer Direct Access Charge rate schedule and associated Plan for Administration filed with the Commission.³¹

Additionally, if APS purchases power under specific terms on behalf of a standard offer special contract customer, the costs of that power may be directly assigned. In both cases, where specific power supply costs are identified and directly assigned to a large returning customer or standard offer special contract customer or group of customers, these costs will be excluded from the Adjustor Rate calculations. Schedule E-36 XL, and AG- I customers are directly assigned power supply costs based on the APS system incremental cost at the time the customer is consuming power from the APS system, so their power supply costs and kWh usage are excluded from the PSA.³²

Organizations Involved in Support of Filings

Exhibit III-1 illustrates APS's Accounting organization in which the highlighted Back Office Reporting group is responsible for identifying the detailed data in APS's general ledger (G/L) and associated data warehouse for creating non-confidential and confidential data up to what APS calls *Level 3* data,³³ which is then provided to the Financial Planning and Revenue Forecasting organization, shown in *Exhibit III-2*, which is responsible for developing and filing the non-confidential and confidential Power Supply Adjustor (PSA) filings to the Arizona Corporation Commission (ACC) on a monthly and annual basis.³⁴ For example, the information taken from the data warehouse by the Accounting organization to provide as part of *Level 3* data includes confidential off-system sales, transaction detail, and explanations page information and data. Other Accounting non-highlighted groups do other confidential input.³⁵

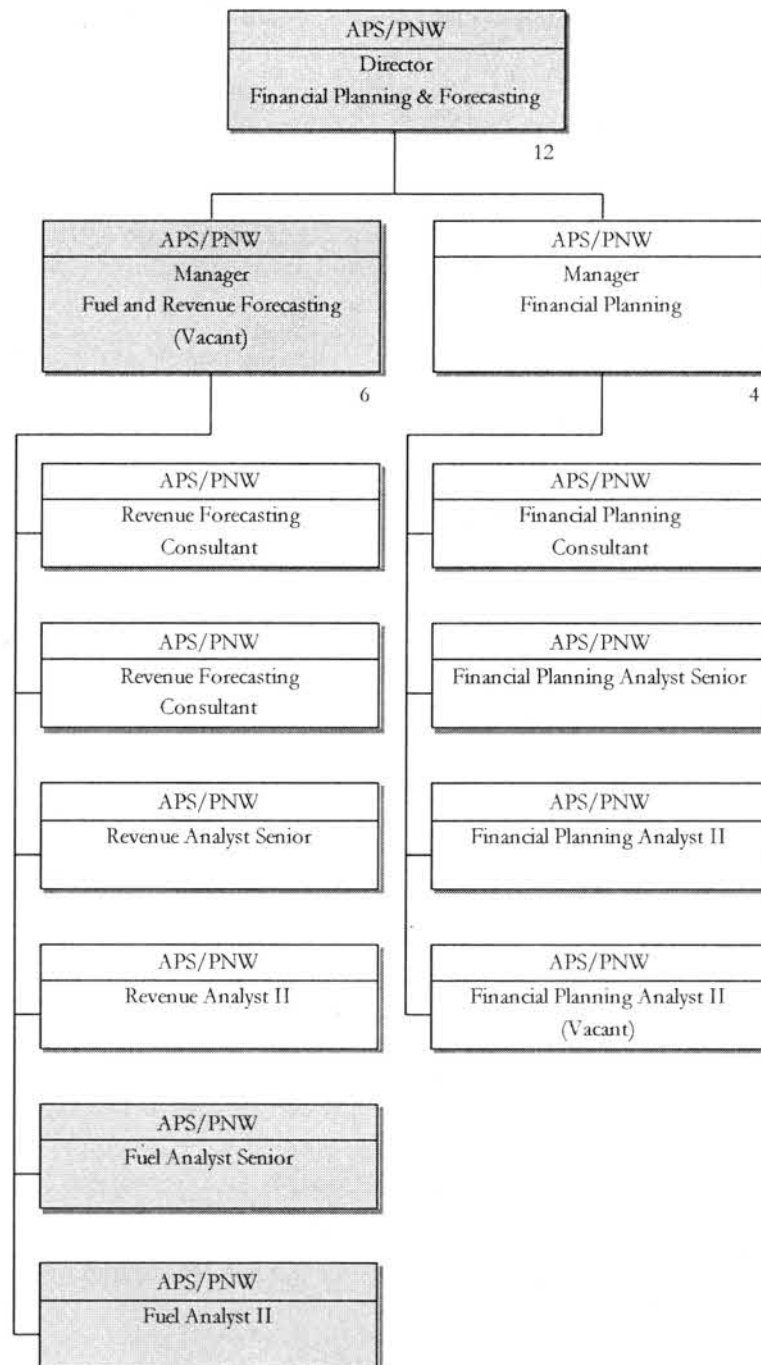
**Exhibit III-1
Accounting Organization
2016**



Source: Information Response 17 and Interview 2



Exhibit III-2
Financial Planning and Revenue Forecasting Organization
2016



Source: Information Response 21 and Interview 2

The Financial Planning and Forecasting group consists of three departments: Financial Planning, Energy and Revenue Analysis and Forecasts, and Fuel Analysis and Forecasts,³⁶ although *Exhibit III-2* seems to look like only two departments.

- ◆ The Financial Planning Department, which reports to the Financial Planning Manager, is responsible for producing and analyzing forecasts of the company's financial statements and related financial metrics under a variety of different scenarios and assumptions. The department's work is performed by four analysts and a manager.
- ◆ The Energy and Revenue Analysis and Forecasts Department, which reports to the Fuel and Revenue Forecasting Manager, is responsible for producing and analyzing forecasts of economic growth, energy demand growth, and associated Company revenues in support of the company's resource planning and financial planning efforts. The department's work is performed by four analysts and a manager whose oversight function also extends to the Fuel Analysis and Forecasts Department.
- ◆ The Fuel Analysis and Forecasts Department, which also reports to the Fuel and Revenue Forecasting Manager, is responsible for producing and analyzing forecasts of the company's fuel and purchased power expenses in support of the company's financial planning efforts and PSA clause filings, among others. This department also performs detailed budget variance analyses in support of the company's monthly close process and prepares the company's monthly PSA filings. The department's work is performed by two analysts and a manager whose oversight function also extends to the Energy and Revenue Analysis and Forecasts Department.



B. Findings & Conclusions

Task 5: Fuel Clause Computations

Finding III-1 Schumaker & Company's review and testing of PSA monthly filings, including sampling of specific months, indicate that these filings are essentially accurate (including applicable kWh purchases and sales, PSA over/under values, supplemental fuel charges or refunds, etc.) and consistent with the values reported; however, PSA filings can sometimes be difficult to tie together based on how spreadsheets are implemented.

Schumaker & Company obtained copies of APS's 2014, 2015, and 2016 year-to-date (through May 2016) filings. Besides our review of many of these filings, in meetings with APS management and staff in the Accounting and Financial Planning and Revenue Forecasting organizations, we reviewed June 2015 and November 2015 filings, including both non-confidential and confidential spreadsheets, which have been submitted to the ACC. APS uses the POA documentation previously discussed as guidelines for these PSA fuel clause filings.³⁷

The non-confidential spreadsheets include a summary page, including Schedule 1 – PSA rate calculation effective February 2015, including current February 1, 2015 and proposed February 1, 2016, plus increase/decrease for:³⁸

- ◆ Forward component rate
- ◆ Historical component rate
- ◆ PSA transition component rate
- ◆ PSA rate

Other worksheets included in this spreadsheet workbook includes schedules as:³⁹

- ◆ Schedule 2 – Forward Component (FC)
- ◆ Schedule 3 – FC Tracking Account
- ◆ Schedule 4 – Historic Component (HC)
- ◆ Schedule 5 – HC Tracking Account
- ◆ Schedule 6 – Transition Component
- ◆ Schedule 7 – Transition Tracking Account
- ◆ Schedule 8 – Account Summary
- ◆ Schedule 9 – Customers Filed
- ◆ Deferral Detail
- ◆ Beaucoup

The confidential spreadsheets include a summary page, including dollars and kWh associated with:⁴⁰

1. Gas Generation Fuel Expense
2. Gas Generation Fuel Expense under Tolling Arrangements
3. Gas Hedges and Mark-to-Market Expense
4. Oil Generation Fuel Expense (includes oil burned at non-oil generating stations)
5. Coal Generation Fuel Expense
6. Nuclear Generation Fuel Expense
7. Owned Renewable Generation
8. Subtotal Generation Fuel Expense [*Sum Lines 1 - 7*]
9. Long-Term Purchased Power Expense
10. Market Purchased Power Expense
11. Other Purchased Power Expense
12. Total System Fuel and Purchase Power Expense [*Sum Lines 8 - 11*]
13. Revenue from Off-System Sales
14. Net Native Load Fuel and Purchased Power Expense [*Line 12 + Line 13*] (represents fuel costs for generated and purchased energy, including system losses)

The base fuel rate was calculated on the basis of energy sales, which excludes system losses included in Line 14; additionally Line 14 calculation includes expenses that were excluded from the base fuel rate.

Other worksheets included in this spreadsheet workbook includes:⁴¹

- ◆ Energy transactions detail for month
- ◆ Other off-system sales volumes and margins by counterparty for month
- ◆ Explanation of negative margins, if applicable, for month
- ◆ Generation data by plant for month and 12 months ending the same month
- ◆ Actual natural gas fuel costs for month
- ◆ Outages by plant/unit for month
- ◆ Outage costs for month
- ◆ Monthly PSA balance, plus APS projection for upcoming 12 months
- ◆ Total projected PSA balance graph
- ◆ Reconciliation between confidential and non-confidential PSA reports
- ◆ Input tabs

Also during interviews, APS management and staff discussed tie-out reconciliation schedules to financial statements, such as:⁴²

- ◆ PSA internal tie-out
- ◆ Financial statement tie-out
- ◆ Power PSA tie-out
- ◆ Natural gas PSA tie-out

To fully understand the filings, Schumaker & Company had not only to review policies and procedures documentation described in Finding III-7, but also meet with APS management and staff to review



computation of monthly fuel clause filings (confidential and non-confidential data) and determine accuracy, plus obtain a comprehensive understanding of the associated business processes and support activities. As such, the monthly PSA filings were in general compliance with filing requirements and the sum total of costs were reasonably accurate⁴³

To fully understand how spreadsheets tie together, plus tie to APS's financial statements, our consultants were required to conduct various interviews, as we found it somewhat difficult to tie together data within the Excel spreadsheets provided by APS, because:⁴⁴

- ◆ Many times figures were not cross-referenced to the proper tab and cell, but simply typed in, making it difficult to confirm that proper information has been included.
- ◆ Occasionally references to schedule #s and line #s were inaccurate, even when APS was selecting the correct data, so that causes confusion.

As part of Schumaker & Company's testing of these spreadsheets, our activities did not result in identifying any wrong figures in the worksheets.

Finding III-2 APS has policies and procedures to ensure compliance with the objectives of the fuel clause.

The policies and procedures identified in the POA documentation, which APS has developed, plus its accounting documentation, both of which are described in *Finding III-7*, are adequate to:

- ◆ Provide for adequate regulatory review of APS's operations under its fuel clause
- ◆ Provide for the stability of utility earning when electric fuel costs and purchased power costs are rising and permit prompt credits to customers when electric fuel costs and purchased power costs are declining
- ◆ Flow through to electricity users the increases and decreases in applicable fuel and purchased power costs per kWh of delivered energy above or below a base cost.

Also, APS's monthly meeting to review filings allows the Accounting organization to ensure that PSA filings include proper non-confidential and confidential data, as it is a different format than what is provided to the Financial Planning and Revenue Forecasting organization, plus departments can ask questions about PSA filings.⁴⁵

Finding III-3 Even though APS's accounting systems have changed since the prior PSA Filings audit, they are adequate and reasonably maintained to provide the necessary collection, reporting, and auditing of the PSA filings.

APS M&T uses a proprietary system (called "TranZ" and discussed more extensively earlier in this report) to control fuel and energy deal information. TranZ tracks power and natural gas transactions from deal entry to settlement and reporting. TranZ also allows the use of Microsoft

Excel worksheets and various Microsoft Access queries, which APS uses for detailed analysis and sub-reporting.

The accounting systems used by the Accounting Department to develop inputs and prepare the reports used in the preparation of the fuel clause filings include:⁴⁶

- ◆ Open Access Technology International, Inc. (OATI) modules, including trade capture, valuation and credit, invoicing and settlement, and independent system operator (ISO) settlements
- ◆ Power Cost, Inc. (PCI) post analysis/transaction costing module
- ◆ Marketing & Trading Data Warehouse (MTDW) reporting in which trade data for the month from OATI, cost allocation information from PCI, and the month-end mark to market results by transaction are stored in the APS MTDW and are then used for reporting and for the accounting close process.
- ◆ Cognos Workspace Advanced (Cognos) and Microsoft Excel in which Cognos is a Web-based tool used to author reports and analyze data based on data out of MTDW. The reports are then exported out of Cognos into Excel to be used for journal entry preparation.
- ◆ Oracle PeopleSoft system, including financial supply chain management involving purchasing and accounts payable, billing and accounts receivable, treasury, and general ledger modules.
- ◆ PowerPlan Powerplant system, a property accounting software system designed for the utility and other asset intensive industries, which is used to query the general ledger and enter regular journal vouchers. All handposting (journal voucher postings outside the two day business day close window) entries are entered into the PeopleSoft general ledger module.

APS M&T uses OATI, a commercial off-the-shelf system developed and supported by Open Access Technology International, Inc. to control gas and power information input to the M&T Data Warehouse (MTDW). OATI was implemented in April 2016 to replace the previously used system called TranZ, an APS developed system for tracking power and natural gas transactions from deal entry to settlement and reporting, which was used in 2015. It also resulted in changes in PCI functionality, including EIM modules and transition operations.⁴⁷ Also there has been a realignment of Front Office by reallocating resources.⁴⁸ OATI includes a series of modules integrated together to provide a “front to back” system, including:⁴⁹

- ◆ Trade capture
- ◆ Valuation and credit
- ◆ Invoicing and settlement
- ◆ ISO settlements, which manages settlements with California Independent System Operator (CAISO), which APS began using in October 2016

APS uses PCI, which at the end of the month, power transactions flow from the webTrader system in OATI to PCI's Post Analysis/Transaction costing module, which provides after the fact costings of



power transactions. The transactions are first matched within books by a hierarchy, including delivery point, trade date and strategy to leave open sales transactions for generation cost.⁵⁰

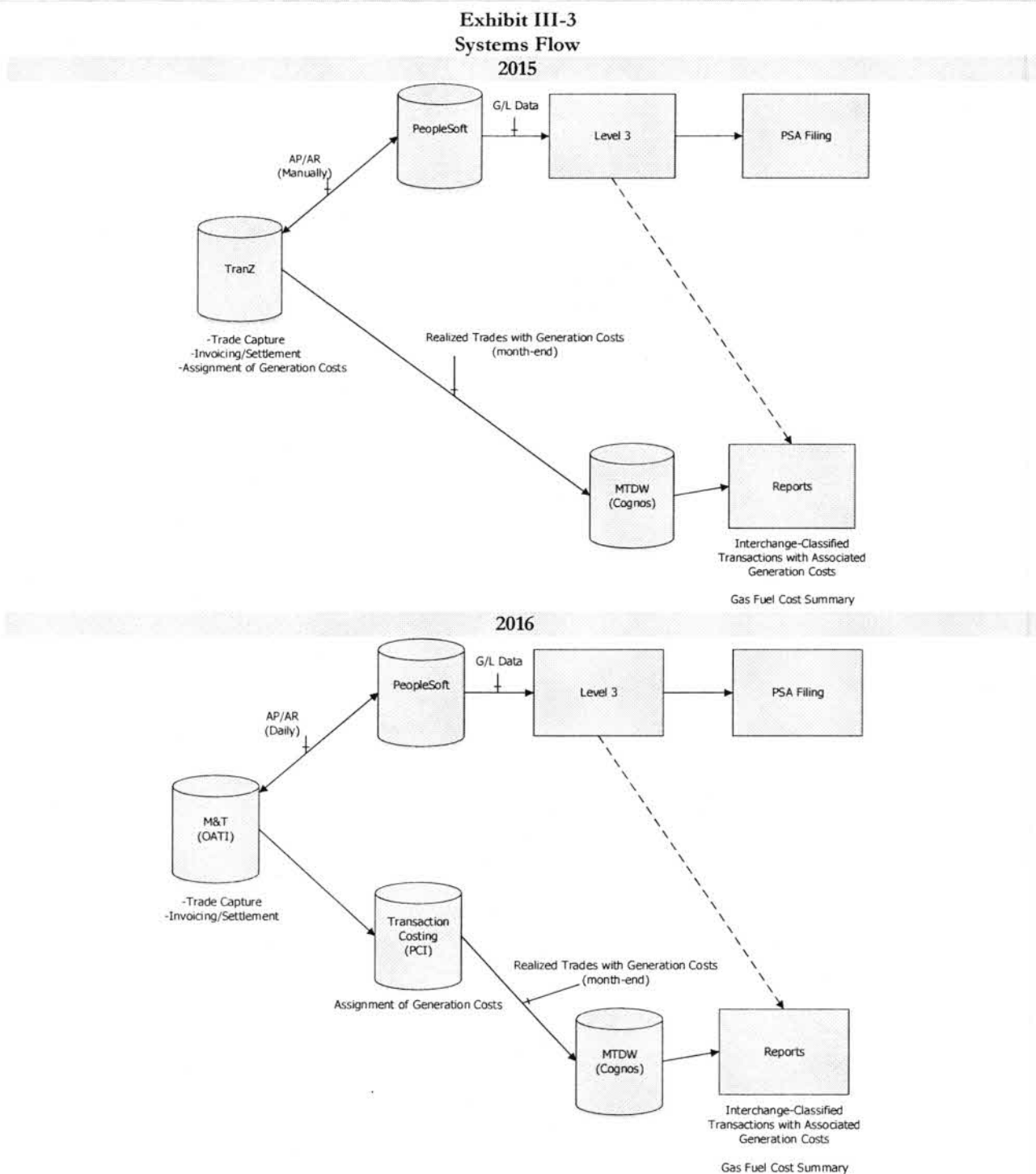
The Marketing & Trading Data Warehouse (MTDW) Reporting Trade data for the month from OATI, cost allocation information from PCI, and the month end mark-to-market results by transaction are stored in the APS MTDW and are then used for reporting and for the accounting close process. The transactions include: power and natural gas physical and financial transactions and the associated physical power sales cost.⁵¹

The Cognos Workspace Advanced is a Web-based tool used to author reports and analyze data, which are used to report data out of MTDW warehouse. The reports are then exported out of the Cognos system into Excel to be used for journal entry preparation. Excel is used in the process of validating coal payments and to account for coal expense and inventory. After validation and management review and approval of invoices, they are paid and processed through the PeopleSoft Accounts Payable (A/P) module. The Accounting Operations group then calculates the coal and inventory expense based on plant burns and coal purchases.⁵²

The PeopleSoft system has several modules used within APS, including Financial Supply Chain Management (FSCM), which is used to manage and record financial and supply chain information. FSCM includes PeopleSoft Purchasing & A/P, PeopleSoft Billing & Accounts Receivable (A/R), PeopleSoft Treasury, and PeopleSoft G/L.⁵³ PeopleSoft is a leading provider of applications designed for large, complex business operations, including many utilities. As previously in the past audit, the general ledger system serves as the central module for financial reporting purposes and it has reporting capabilities, which enables it to generate, on an account-by-account basis, reports that provide summary descriptions of accounting entry transactions. It also provides the capability to “drill down” through transactions to explore the underlying supporting information, in which detailed information is provided in system modules interfacing with the PeopleSoft G/L module.⁵⁴

PowerPlant is a property accounting software system designed for the utility and other asset intensive industries. It is used by APS to query the general ledger and enter regular journal vouchers. All handposting (journal voucher postings outside the two day business day close window) entries are entered into PeopleSoft G/L. All financial applications and modules are consolidated within PeopleSoft G/L. The data from the FSCM a module is consolidated within the PeopleSoft G/L and is synchronized daily with information from PowerPlant.⁵⁵

Exhibit III-3 illustrates the 2015 and 2016 (since March 2016) system flows.⁵⁶



Source: Interview 16



APS maintains its books and records in accordance with the FERC's Uniform System of Accounts (USOA) that the ACC has adopted. APS's computerized accounting system is now PeopleSoft, which was implemented in roughly 2007. A number of accounting interface modules have links to the general ledger module. The accounting system's general ledger module, along with a Marketing & Trading (M&T) data warehouse, serves as the central elements for financial reporting purposes using the Cognos reporting tool.⁵⁷

Finding III-4 The systems used by the Financial Planning and Forecasting group are also adequate and reasonably maintained to provide the necessary collection, reporting, and auditing of the PSA filings.

For the development of energy demand and revenue data included in the PSA filings, the Financial Planning and Forecasting group relies on APS's Customer Information System (CIS) and the Energy Management System (EMS).⁵⁸

- ◆ CIS is the billing engine for the company's retail customers and, as such, it records and tracks data relevant to customer energy demand and billing amounts. Individual customer bills are created within CIS, and CIS is used to aggregate those bills by customer class and billing cycle, so that the total kWh consumed by the company's customers and the revenues billed, including PSA-specific charges, to those customers may be queried via Cognos.
- ◆ EMS is used to record and track the amount of energy produced by the company's power plants, as well as all energy exchanged with other utility systems – whether through purchases and sales or through in-kind exchanges or inadvertent power flows – so that a total amount of energy demand on the APS system can be determined for every hour. These energy amounts are aggregated for each calendar month and the total calendar month energy is reconciled to the CIS-reported billing month energy amounts through the use of the billing cycle meter read schedule in the calculation of unbilled energy each month. Microsoft Excel is used to perform these calculations. EMS captures the power production and exchange data primarily through a telemetry system which records hourly meter reads at the company's power plants and at interconnection points with other utility systems.
- ◆ In addition to CIS, EMS and other systems discussed above, which are used by the Accounting group, Microsoft Excel is utilized to prepare certain intermediate analyses/reports and the final PSA filings.

Finding III-5 APS internal/external audits do not address PSA filing preparation.

According to APS Accounting management, not any internal or external audits specifically involving development or accounting of data for 2014, 2015, or 2016 YTD fuel clause filings⁵⁹ nor any internal or external audits specifically involving preparation of 2014, 2015, or 2016 YTD fuel clause filings⁶⁰ have been performed. The only external audits performed for accounting data result in APS's 10Q or 10k reports only.⁶¹

Finding III-6 Although APS was able to provide flowcharts/narratives for many processes, flowcharts/narratives for the PSA filings were not made available.

APS provided flowcharts/narratives for the following processes:⁶²

- ◆ Expenditures Process
- ◆ Financial Reporting Systems Process
- ◆ Fixed Assets Process
- ◆ MS Inventory Process
- ◆ Nuclear Fuel Process
- ◆ Payroll Process
- ◆ Pension OPEB Obligation Process
- ◆ Deal Execution Capture Process
- ◆ Confirmations Process
- ◆ Contracts Process
- ◆ Credit Process
- ◆ Valuation Process
- ◆ Power Settlements and Invoicing Process
- ◆ Gas Settlements and Invoicing Process
- ◆ Coal and Oil Settlements Process
- ◆ Carbon Credits Process
- ◆ CAISO Process
- ◆ Derivative Accounting Process
- ◆ Financial Reporting Process
- ◆ Credit Risk Process
- ◆ Fair Value Process
- ◆ Systems Overview
- ◆ Tax Process
- ◆ Treasury Process

However, no flowcharts were able to be provided by APS regarding PSA filings preparation and submittal.⁶³



Task 6: APS's Fuel Clause Related Policies, Procedures, Rules, Cost Allocations and Manuals, etc.

Finding III-7 APS's PSA accounting and filing documentation has improved since the last fuel audit was completed in 2006; however, some modifications would be helpful.

APS has PSA POA documentation effective February 6, 2013, which has much detailed information regarding an overview of the PSA filings.⁶⁴ The POA documentation developed by APS includes narratives, including:⁶⁵

- ◆ General description
- ◆ PSA components
- ◆ Calculation of the PSA rate
- ◆ Filing and procedural deadlines
- ◆ Verification and audit
- ◆ Definitions
- ◆ Schedules
- ◆ Compliance reports
- ◆ Allowable costs




















It also developed documentation regarding the monthly PSA filing process, which is considered essentially the middle step for each of monthly filings required by the PSA's POA, as well as the preliminary and final calculations of the succeeding PSA year's forward and historical PSA charges filed at the end of the third and fourth quarters (September 30 and December 30, respectively).⁶⁶ This documentation includes a description of steps involved in the following:⁶⁷

- ◆ Annual updates
- ◆ Monthly update process (non-confidential filing)
- ◆ Monthly update process (confidential filing)
- ◆ Monthly review process, including:⁶⁸
 - Once complete, review all filings with Fuel Analysis and Forecasts Department management.
 - After management review, continue review of all filings with representatives of the Financial Planning and Revenue Forecasting (filings), Fuel Analysis and Forecasting, State Regulatory-Legal, Rates and Rate Strategy, Financial Control and Back Office Operations, Accounting Operations, Revenue and Regulatory Accounting (deferrals), Fossil Fuel Procurement, and Finance and Business Operations groups in a standing monthly meeting (generally around 20th of month), in which sign-in sheets for this meeting are to be circulated in the meeting and kept for audit purposes. For example, this meeting allows the Accounting organization to ensure that PSA filings include proper non-confidential and confidential data, as it is a different format than what is provided to the Financial Planning and Revenue Forecasting organization, plus departments can ask questions about PSA filings.

- Provide completed filings with attestation to Regulatory Department for filing with the Commission.

Prior to this middle step, APS follows various accounting procedures to gather and verify the numbers that are plugged into the monthly reports referenced above. These procedures provided include the files shown in *Exhibit III-4*.⁶⁹

Exhibit III-4
Accounting Documentation

-  APSRC00941_Cholla Fuel Journal Entry_CONF.pdf
-  APSRC00942_Accounting Guidelines for Commodity Hedging and Risk Management_CONF.pdf
-  APSRC00940_May 2016 PSA Native File.xlsx
-  APSRC00943_Measuring and Reporting Fair Value_CONF.pdf
-  APSRC00944_Power Settlement and Invoicing_CONF.pdf
-  APSRC00945_Gas Settlement and Invoicing_CONF.pdf
-  APSRC00946_Broker Fee Settlement_CONF.pdf
-  APSRC00948_Tolling Agreements_CONF.pdf
-  APSRC00947_CAISO Settlements_CONF.pdf
-  APSRC00949_Accounting for California Carbon Allowances_CONF.pdf
-  APSRC00950_Gas Fuel Cost Summary Procedure_CONF.pdf
-  APSRC00951_Gas Interchange Accounting Final and Gas Reclassification Journal Entries_CONF.pdf
-  APSRC00952_California Carbon Allowance Accounting_CONF.pdf
-  APSRC00953_JP Morgan Futures Accounting_CONF.pdf
-  APSRC00954_Tolling Accounting_CONF.pdf
-  APSRC00956_Ops Statement Preparation and Reconciliation to General Ledger_CONF.pdf
-  APSRC00957_4C Coal Expense JV_CONF.pdf
-  APSRC00955_Transaction Costing and MTDW Population_CONF.pdf
-  APSRC00958_PSA Monthly Process Financial Reporting_CONF.pdf

Source: Information Response 13 Monthly PSA Filing documentation

APS accounting practices provide for appropriate GAGAS, GAAP, and regulatory accounting practices; however, APS's fuel clause related policies, procedures, rules, cost allocations and manuals, etc. are essentially adequate and appropriate from the perspective of retail ratepayers and shareholders; however, no summary exists to guide through the PSA filing process or explain how data in worksheets used by the Accounting and Financial Planning and Revenue Forecasting groups tie together, nor does adequate screen prints exist for documentation, especially for PSA filings.



Finding III-8 Also, no policy or procedures documentation exists addressing supplemental fuel charges or refunds, although its policy now addresses the prior audit report recommendation.

There are no policy or procedures documentation specifically addressing supplemental fuel charges or refunds, but it is APS's policy to comply with GAAP and FERC requirements for financial reporting. APS management indicates that it may also consider available guidance from previous FERC compliance audits in addition to the regulatory and accounting requirements to determine the appropriate accounting treatment for infrequent and/or unusual events, such as supplemental fuel charges and refunds. With this process, APS indicates that settlement payments or receipts would be assessed in a manner consistent with *Recommendation 5* in the prior fuel audit shown below:⁷⁰

Closely review and monitor adjustments to fuel costs to assure that supplemental charges and refunds appropriately consider the impact on inventory values and fuel expenses for financial reporting purposes.

APS management also indicates that a more recent example would be the analysis of the accounting for the repair of fuel assemblies, which were damaged during a Unit 2 refueling in the fall of 2015. As a result of the analysis, APS charged the costs of materials to build the new cages for the damaged assemblies to Fuel in Process (Account 120.1) while the cost of the old cages were written off to fuel expense (Account 518) along with the costs of repairs.

Finding III-9 APS's Enterprise Risk Management program is a fairly comprehensive program.

The APS has an Enterprise Risk Management program, which focuses on enterprise-wide risk factors, such as:⁷¹

- ◆ Regulatory risks
- ◆ Operational risks
- ◆ Financial risks

Annually the ERM organization reaches out to APS groups to develop company risk factors by letting the group know how to identify risks and how to categorize risks. Then annually a listing of the top 10 risks are provided to the Board of Directors. Specific risk factors in the three categories listed above are also provided in the APS 10-k report (Section 1-A) with narrative describing each.⁷²

In addition to the risk factors described in *Item 1A* and in *Item 7 — "Management's Discussion and Analysis of Financial Condition and Results of Operations,"* these factors include, according to APS management, but are not limited to:⁷³

- ◆ Our ability to manage capital expenditures and operations and maintenance costs while maintaining reliability and customer service levels;

- ◆ Variations in demand for electricity, including those due to weather, the general economy, customer and sales growth (or decline), and the effects of energy conservation measures and distributed generation;
- ◆ Power plant and transmission system performance and outages;
- ◆ Competition in retail and wholesale power markets;
- ◆ Regulatory and judicial decisions, developments and proceedings;
- ◆ New legislation or regulation, including those relating to environmental requirements, nuclear plant operations and potential deregulation of retail electric markets;
- ◆ Fuel and water supply availability;
- ◆ Our ability to achieve timely and adequate rate recovery of our costs, including returns on and of debt and equity capital investment;
- ◆ Our ability to meet renewable energy and energy efficiency mandates and recover related costs;
- ◆ Risks inherent in the operation of nuclear facilities, including spent fuel disposal uncertainty;
- ◆ Current and future economic conditions in Arizona, including in real estate markets;
- ◆ The development of new technologies which may affect electric sales or delivery;
- ◆ The cost of debt and equity capital and the ability to access capital markets when required;
- ◆ Environmental and other concerns surrounding coal-fired generation, including regulation of greenhouse gas emissions;
- ◆ Volatile fuel and purchased power costs;
- ◆ The investment performance of the assets of our nuclear decommissioning trust, pension, and other postretirement benefit plans and the resulting impact on future funding requirements;
- ◆ The liquidity of wholesale power markets and the use of derivative contracts in our business;
- ◆ Potential shortfalls in insurance coverage;
- ◆ New accounting requirements or new interpretations of existing requirements;
- ◆ Generation, transmission, and distribution facility and system conditions and operating costs;
- ◆ The ability to meet the anticipated future need for additional generation and associated transmission facilities in our region;
- ◆ The willingness or ability of our counterparties, power plant participants and power plant land owners to meet contractual or other obligations or extend the rights for continued power plant operations; and
- ◆ Restrictions on dividends or other provisions in our credit agreements and ACC orders.



APS believes that it has fairly robust energy/risk management guidelines. This information involves multiple departments, including Accounting, Legal, and Energy/Risk Management, and is signed off by the Director of Enterprise Risk Management.⁷⁴

Finding III-10 **APS's energy risk management activities are comprehensive and fairly well documented, but documentation could slightly be improved through use of screen captures.**

Through the Enterprise Risk Management group and associated control documents, APS has implemented a risk management process, which aligns its energy business commodity practices with its financial objectives and risk tolerances. The energy risk management process includes, among others, the following elements:⁷⁵

- ◆ Identification of risks
- ◆ Measurement and assessment of potential risk impacts, both qualitatively and quantitatively
- ◆ Establishment and, as warranted, revision of the System Hedge policies, as well as applicable risk limits and guidelines
- ◆ Execution of transactions and conduct of all applicable activities in a manner that is consistent with the company's risk tolerance and the Energy Risk Management process documentation, also referenced as guidelines
- ◆ Properly recording positions and process transactions in accordance with the Energy Risk Management procedures and model documentation
- ◆ Validation of policies, guidelines, procedures, methodologies, and models on an ongoing basis
- ◆ Monitoring and reporting of performance against approved targets

The type of Energy Risk Management documentation provided to Schumaker & Company during this fuel audit included:⁷⁶

- ◆ Energy Risk Management process documentation (also referred to as "guidelines")⁷⁷
 - Purpose and applicability
 - Terms and definitions
 - Responsibilities
 - Precautions and limitations
 - Prerequisites
 - Process descriptions, including portfolio valuation and risk limits, credit risk, and control processes
 - Resources and associated documentation

- Related documents/Executive Risk Committee charter, Enterprise Risk Management policy, Energy Risk Management procedures, and listing from Front Office and Back Office procedures
- Key contacts
- Development history
- Attachments
 - Approved Product List
 - Primary Product Definitions
 - Structures as of December, 2013
 - Management Reports – Control Process
 - Compliance With FERC Market Rules
 - Sample of the Non-Standard Transaction Form
 - Resource Management Non-Standard Deal Form
 - Dodd-Frank Title VII Compliance Summary
 - New Product, Market and Service Approval Form
 - Vetting Form
 - Nuclear Fuel Credit Risk
 - Employee Confirmation APS
- ◆ Energy Risk Management procedures documentation⁷⁸
 - Purpose and applicability
 - Precautions and limitations
 - Risk control – pricing, valuation, and risk measurements
 - Risk control – deal capture, validation, and oversight
 - Credit risk
 - Risk analysis
 - Contract administration
 - Non-standard deal process
 - New product/new service
 - Business continuity plan
 - Related documents – exhibits and detailed procedures
 - Attachments – process flow diagrams
 - Key contacts
 - Approvals
 - Revisions
- ◆ Energy Risk Management Model documentation⁷⁹
 - Purpose and applicability
 - Related documents



- Measurement of market risks, including electricity and gas mark-to-market calculations; emission mark-to-market calculations (SO₂ and CO₂); transportation mark-to-market calculations; external evaluations; discount mark-to-market calculations, and stress test
- Measurement and management of credit risks
- Data requirements (source and derivations)
- Volatilities
- Valuation reserves
- Attachments
- Key contacts
- Approvals
- Revisions
- Attachments
 - APS Energy Risk Management Guidelines
 - Energy Risk Management Procedures
 - Ice Trade Vault Front End Participant User Guide
 - Valuing Forward Start Options
 - TranZ MTM Group & Calculations
 - Interest Rate Extrapolation
 - Volatility Calculation Methodology
 - Credit Exposure Definitions
 - Credit Review Process Guide
 - Derivative Pricing Manuals

The Energy Risk Management Process documentation establishes standards for monitoring and controlling the financial risks associated with APS's commodity transacting activities, including the Front Office transactions related to hedging and resource and fuel procurement activities. The compliance with the Energy Risk Management Process documentation is the responsibility of the Front Office; monitored by the Director of Enterprise Risk Management, the Risk Control group, and the Compliance group; periodically audited by the Director of Audit Services; and overseen by the Energy Risk Oversight Group (EROG),⁸⁰ which is comprised of the following individuals:⁸¹

- ◆ Executive Vice President & CFO, Pinnacle West & APS
- ◆ Vice President Resource Management
- ◆ General Manager Resource Management
- ◆ Vice President Controller & Chief Accounting Officer
- ◆ Vice President Fossil Generation
- ◆ Director Resource Operations & Trading
- ◆ Director Fuel & Business Support
- ◆ Director Enterprise Risk

In 2015, the Treasurer and also the Nuclear Vice President were part of the EROG, but no longer in 2016.⁸²

The EROG is responsible for, but not limited to, the following:⁸³

- ◆ Overseeing enforcement activities conducted or administered by the Enterprise Risk Management group
- ◆ Reviewing and approving summaries of any deviations from the guidelines and directing implementation of any corrective action as applicable
- ◆ Reviewing credit and cash exposure information in aggregate and by individual counterparties
- ◆ At the direction of its Chairperson, presenting reports to the Executive Risk Committee (ERC) on material energy risk exposures arising from the company's business
- ◆ Reviewing and approving significant changes to counterparty credit risk limits and mitigation strategies
- ◆ Reviewing and approving new products/markets, and trading instruments as permitted by these guidelines
- ◆ Final approval of changes to the guidelines
- ◆ Overseeing the implementation of the System Hedge Policy and related Resource Management Department hedge policies provided; however, that any material changes or alterations to the System Hedge Policy are exclusively reserved for the ERC

Typically, the documentation is reviewed annually, and adjusted as necessary. However, the process and procedures documentation was last modified in 2014, as APS was waiting on the implementation of the new trade capture and the associated changes in trader responsibilities, which occurred in 2016, and the revised documentation is anticipated to be completed by 2016 year-end.⁸⁴

The APS employees associated with energy risk management activities are trained when a new employee, each year when entering summer and entering winter, or when documentation has been updated. Also annually these employees are required to sign an Employee Confirmation form for the guidelines, which confirms that the employee has read and understands the risk controls, standards, and policies, as they relate to energy transactions and energy risk management as performed for the company. Compliance with these guidelines is an employment requirement and is considered in each individual's overall performance evaluation and compensation calculation, which includes the execution of day-to-day responsibilities by all personnel discussed as having energy risk management duties, or trader capacity to transact in the wholesale market, as personnel are supposed to comply with the guidelines in their entirety. Any incidence of non-compliance with these guidelines may be considered a violation, and subject to possible sanctions.⁸⁵

APS's regulated electricity business consists of traditional retail and wholesale electricity related activities. In connection with the management of these activities, the company enters into a variety of energy and energy-related commodity transactions to meet its energy requirements, including real-time, day-ahead, and forward contracts for the sale or purchase of electricity and natural gas and the acquisition of necessary electric transmission and natural gas pipeline capacity. The guidelines apply to



all energy and energy-related commodity transactions, including transactions involving physical delivery and/or derivative financial instruments, such as swaps, options, futures, exchanges, or other similar contractual agreements (derivative instruments), which may be used as a means to manage financial risk associated with the company's energy requirements; however, the guidelines do not govern capital projects, including the development, construction, or acquisition of generation facilities.⁸⁶

The Energy Risk Management process documentation also identifies the roles and responsibilities of the following groups:⁸⁷

- ◆ Front Office, which conducts transacting activities, such as system operations, resource acquisition, and fuel procurement, as well as long-term nuclear fuel transactions for physical delivery.
- ◆ Middle Office, which is responsible for controls, audits, and contract administration.
- ◆ Back Office, which is responsible for settlements and reporting.

Finding III-11 APS establishment of credit dollar limitations and credit evaluation of counterparties is reasonable; however, some system configuration updates could be made when a counterparty vetting occurs that it is overexposed.

APS's credit limits are managed in accordance with its Energy Risk Management Process guidelines. Any transactions governed by these guidelines require approval from the ERM Credit Risk group as to both counterparty and counterparty credit limits.⁸⁸ APS has established specific credit limits for each counterparty with which it conducts trading transactions.⁸⁹

These guidelines are for measuring, monitoring, and managing the inherent credit risks across the various activities of its energy operating units. By using these credit guidelines, APS intends to limit its exposure and the exposure of its subsidiary companies or operating units to unwanted credit risk and thus minimize the impact of counterparty default and credit-related losses. Broadly defined, credit exposure is the capital-at-risk in the event of a counterparty default in a transaction. More specifically, it is an estimate of the economic loss that might be incurred if a counterparty is unable or unwilling to fulfill its contractual and payment obligations. These obligations are often referred to as "liquidated damages" by APS. The credit exposure is calculated for each counterparty for which there is one or more unsatisfied contracts or open trading positions and without regard to credit reserves or forecast of recovery in the event of default. The credit exposure is calculated daily based on market prices and positions as of the close of business the day before. It is done using systematic calculations for new counterparties; existing counterparties that have reached the time limitations for re-vetting; or existing counterparties who have a change, such as bankruptcy, invoices not paid, etc.⁹⁰

Credit exposures may be netted within a set of trades for the same commodity, if there is a contractual basis for netting with a high probability of legal enforceability. The netting of exposures within different legal entities is not permitted even with a cross-entity netting agreement due to the risk of legal challenge.⁹¹

The ERM Credit Risks group (also called the Credit Risk Management group) is responsible for:⁹²

- ◆ Counterparty vetting, which is to ensure, as far as can be reasonably determined, that before APS becomes irrevocably committed to any transaction, the counterparty is definitively identified as being the correct legal entity to enter into the proposed engagements, has the legal capacity to enter into proposed engagements, and has passed the creditworthiness standards of APS. Vetting is the initial step in the review of a counterparty and does not address the counterparty's credit limit, which is addressed in the credit review process.
- ◆ Rating methodology development, which provides a documented analytical framework to be used in the assessment of trading counterparties. Regardless of counterparty type, the rating methodology focuses the analysis on: financial strength; corporate organizational structure; competitive position; and risk management competencies.
- ◆ Credit limit authority levels for granting unsecured credit limits.
- ◆ Limit reporting for the accurate and timely (same-day) input of static data, (counterparty names, ratings, limits) in the daily Credit Exposure Report and for ensuring that data integrity of the report is preserved at all times. Moreover, it will ensure that exposures are updated and monitored on a daily basis, plus it also monitors all margins either posted or received and verifies accuracy of margin amounts, including amounts posted to or received from clearing brokers. Excesses in either the limits or the tenor restrictions are communicated to the Credit Risk Manager and Trading Floor Control with a recommended course of action.
- ◆ Credit quality assurance in which it will manage the overall credit portfolio quality at the Company's level and report the portfolio quality to the EROG on a bi-monthly basis, including credit evaluation of specific counterparties.
- ◆ Establishment of default probabilities in which based on the rating, the probability of default and potential for loss in the event of default are developed. Although many companies use historic default probabilities and recovery rates, by rating, from public rating agencies, APS uses a higher default probability.
- ◆ Approval of trades that exceed credit limits or credit availability, as established credit lines are intended to give traders the flexibility to enter into new trades with counterparty without having to seek credit approval for that trade. If a trade is being considered that does not fit within the available credit limits for the counterparty in question or if no credit limits exist for the counterparty, credit approval for that trade is required. The credit limits may be granted up to the approval level limit of the grantor according to a credit limit authority matrix.

According to APS management, when a counterparty vetting shows that it is overexposed, APS shuts it off; however, it does not shut it off in systems, but provides traders with a daily report.



C. Recommendations

Task 5: Fuel Clause Computations

Recommendation III-1 **Improve spreadsheet usage and associated references and cross-references on how used. (Refer to Finding III-1)**

As discussed previously, PSA filings can sometimes be difficult to tie together without meetings with APS management and staff based on how spreadsheets are implemented. Some improvements, which would be helpful to better understand APS's spreadsheets and associated processes, include:

- ◆ As many times figures were not cross-referenced to the proper tab and cell, but simply typed in, making it difficult to confirm that proper information has been included, APS should cross-reference cells in more circumstances.
- ◆ As occasionally references to schedule #s and line #s were inaccurate, even though correct data were being used, review of such references should be updated whenever possible.

Task 6: APS's Fuel Clause Related Policies, Procedures, Rules, Cost Allocations and Manuals, etc.

Recommendation III-2 **Have internal or external auditors audit PSA filings, as they have yet to address PSA filing procedures. (Refer to Finding III-5.)**

Developing data for PSA filings, including confidential and non-confidential data, should be regularly reviewed by an APS auditor to ensure not only that information and data are accurate, but also that appropriate documentation and spreadsheets exist.

Recommendation III-3 **Incorporate more detailed implementation steps, including sample screen prints, in Monthly PSA Filings documentation, plus risk management documentation, which should be reviewed and modified, as necessary, at least annually. (Refer to Finding III-6, Finding III-7, and Finding III-10.)**

While more extensive documentation now exists than previously during the last PSA filings audit, it still is not sufficient enough to have someone try to actually perform steps solely using the documentation. Some improvements, which would be helpful to better understand APS's documentation, include:

- ◆ Develop summary documentation to guide through the PSA filing process and explain how data in worksheets used by the Accounting and Financial Planning and Revenue Forecasting groups tie together.

- ◆ Sample screen prints should be incorporated to make it easier for APS employees to understand what to do.
- ◆ Flowcharts should be developed for the entire PSA filing process, so outsiders can more fully understand it.

The POA documentation is only revised after every rate case,⁹³ but should be regularly reviewed at least annually and modified, as appropriate.

Additionally, APS's risk management documentation should be regularly reviewed at least annually and modified, as appropriate, plus add sample screen prints included, when appropriate.

Recommendation III-4 Develop formal written documentation for supplemental fuel charges or refunds. (Refer to Finding III-8.)

APS Accounting should develop formal written documentation showing policies and procedures for how it accounts for supplemental fuel charges or refunds to ensure that proper activities occur when analyzing specific situations.

Recommendation III-5 When a counterparty vetting shows that it is overexposed, some system configuration updates could be made. (Refer to Finding III-11.)

When a counterparty vetting shows that it is overexposed, not only should APS provide traders with a daily report when a counterparty is shut off, but also system(s) should be immediately reconfigured to not allow transactions with the counterparty.

¹ / Information Response 6

² / Information Response 6

³ / Information Response 6

⁴ / Interview 1 Cholla Plant Trip

⁵ / Interview 1 Cholla Plant Trip

⁶ / Interview 1 Cholla Plant Trip

⁷ / Interview 1 Cholla Plant Trip

⁸ / Interview 1 Cholla Plant Trip

⁹ / Interview 1 Cholla Plant Trip

¹⁰ / Interview 1 Cholla Plant Trip

¹¹ / Interview 1 Cholla Plant Trip

¹² / Interview 1 Cholla Plant Trip

¹³ / Interview 1 Cholla Plant Trip

¹⁴ / Interview 9 Redhawk Plant Tour

¹⁵ / Interview 9 Redhawk Plant Tour

¹⁶ / Interview 9 Redhawk Plant Tour

¹⁷ / Information Response 1

¹⁸ / Information Response 1



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- ¹⁹ / Information Response 1
- ²⁰ / Information Response 3 & 9
- ²¹ / Information Response 3 & 9
- ²² / Information Response 3 & 9
- ²³ / Information Response 3 & 9
- ²⁴ / Information Response 4
- ²⁵ / Information Response 13 Power Supply Adjustment Plan of Administration documentation and Information Response 18
- ²⁶ / Information Response 13 Power Supply Adjustment Plan of Administration documentation and Information Response 18
- ²⁷ / Information Response 13 Power Supply Adjustment Plan of Administration documentation and Information Response 18
- ²⁸ / Information Response 13 Power Supply Adjustment Plan of Administration documentation
- ²⁹ / Information Response 13 Power Supply Adjustment Plan of Administration documentation
- ³⁰ / Information Response 13 and Interview 3
- ³¹ / Information Response 13
- ³² / Information Response 13
- ³³ / Information Response 17 and Interview 2
- ³⁴ / Information Response 21 and Interview 3
- ³⁵ / Interview 2
- ³⁶ / Information Response 21
- ³⁷ / Information Response 12 and Interview 13
- ³⁸ / Information Response 12
- ³⁹ / Information Response 12
- ⁴⁰ / Information Response 12
- ⁴¹ / Information Response 12
- ⁴² / Information Response 27 and Interview 15
- ⁴³ / Information Responses 12, 13, and 14 and Interviews 2, 3, and 13
- ⁴⁴ / Interviews 2, 3, 13, and 15
- ⁴⁵ / Information Response 13 Monthly PSA Filing documentation and Interviews 2 and 3
- ⁴⁶ / Information Response 26
- ⁴⁷ / Interview 12
- ⁴⁸ / Interview 12
- ⁴⁹ / Interview 2
- ⁵⁰ / Information Response 26
- ⁵¹ / Information Response 26
- ⁵² / Information Response 26
- ⁵³ / Information Response 26
- ⁵⁴ / Interviews 2 and 16 and Prior Audit Report (published in 2006)
- ⁵⁵ / Information Response 26
- ⁵⁶ / Interview 16
- ⁵⁷ / Interview 2
- ⁵⁸ / Information Response 26
- ⁵⁹ / Information Response 19
- ⁶⁰ / Information Response 20
- ⁶¹ / Information Responses 19 and 20 and Interview 12
- ⁶² / Information Response 28
- ⁶³ / Information Response 28
- ⁶⁴ / Information Response 13 PSA Overview documentation
- ⁶⁵ / Information Response 13 Power Supply Adjustment Plan of Administration documentation
- ⁶⁶ / Information Response 13 Monthly PSA Filing documentation

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- ⁶⁷ / Information Response 13 Monthly PSA Filing documentation
- ⁶⁸ / Information Response 13 Monthly PSA Filing documentation, Information Response 17, and Interviews 2 and 3
- ⁶⁹ / Information Response 13 Monthly PSA Filing documentation
- ⁷⁰ / Information Response 34
- ⁷¹ / Interview 12 and Information Response 16
- ⁷² / Interviews 2 and 12 and Information Response 16, including description and APS 2015 10K
- ⁷³ / Information Response 16 (APS 2015 10K)
- ⁷⁴ / Interview 2
- ⁷⁵ / Interview 12 and Information Responses 3 and 29
- ⁷⁶ / Information Response 3 and 29
- ⁷⁷ / Information Response 3
- ⁷⁸ / Information Response 29
- ⁷⁹ / Information Response 29
- ⁸⁰ / Information Response 3
- ⁸¹ / Information Response 16
- ⁸² / Interview 12
- ⁸³ / Information Response 16
- ⁸⁴ / Interview 12
- ⁸⁵ / Interview 12 and Information Response 29
- ⁸⁶ / Information Response 3
- ⁸⁷ / Interview 12 and Information Response 3
- ⁸⁸ / Information Response 15 and Interview 12
- ⁸⁹ / Information Response 15 and Interview 12
- ⁹⁰ / Information Response 15
- ⁹¹ / Information Response 15
- ⁹² / Information Responses 15 and 34 (bi-monthly credit reports to EROG)
- ⁹³ / Interview 3



Mr. Dennis J. Schumaker, CMC®, PMP®, MCSE, MCSA Project Manager & Executive Consultant I

Background

Mr. Dennis J. Schumaker has over 30 years of business and industry experience with both private and public sector clients, including extensive experience in the electric, gas, telephone, and water utility industries. Mr. Schumaker's consulting experience encompasses expertise in executive management and staffing, strategic and corporate planning, corporate organization and structure, project management, business process re-engineering, materials management, engineering and construction and operations and maintenance (electric, telephone, gas, and water facilities), information technology, cost allocation and affiliated transactions, and quality assurance. He began his career as a *Design Engineer* with the Bechtel Corporation, after which he joined Theodore Barry & Associates (TB&A) as a *Manager*. He acquired more than eight years of consulting experience with TB&A before becoming one of the original founders of Schumaker & Company in 1986.

Education & Certifications

Mr. Schumaker holds both a Bachelor's degree in Mechanical Engineering and a Master's in Nuclear Engineering from the Ohio State University. He also earned an MBA from the University of Michigan. He is a:

- ◆ Certified Management Consultant (CMC®)
- ◆ Project Management Professional (PMP®)
- ◆ Microsoft Certified Systems Engineer (MCSE)
- ◆ Microsoft Certified Systems Administrator (MCSA)

Consulting Expertise

- ◆ Strategic and operations planning
- ◆ Management and operations reviews and assessments
- ◆ Business process re-engineering
- ◆ Project management services
- ◆ Quality assurance services
- ◆ Competitive analyses including customer surveys
- ◆ User requirements definition and needs assessments
- ◆ Information systems design and development
- ◆ Information technology planning, integration, and optimization
- ◆ Workforce management
- ◆ Affiliate relations and transactions

Professional Affiliations

- ◆ Project Management Institute (PMI)
- ◆ Microsoft Project User Group (MPUG) South East Michigan Chapter
- ◆ PMI Great Lakes Chapter
- ◆ Institute of Management Consultants (IMCUSA)

State & Local Government Experience

Mr. Schumaker has performed numerous assignments for state and local government clients. This work has included strategic and operations planning assistance, management and operations reviews, business process reviews, information technology studies, and information technology systems implementation projects. Some examples include:

- ◆ City of Detroit – provided business process reviews and assessment in public works, streets, and fire department.
- ◆ City of Ann Arbor – Management and operations review of Ann Arbor Housing Commission
- ◆ City of Sturgis, Marshall, Coldwater – management and operations review of all city operations
- ◆ City of Dearborn – information technology assessment and parks and recreations assessments
- ◆ Wayne County Airport Authority – information technology assessment
- ◆ State of Michigan, Department of Environmental Quality – functional requirements definition and document management systems implementation



State government entities include:

♦ Alaska	♦ Indiana	♦ Michigan	♦ New Jersey	♦ S. Dakota
♦ Arizona	♦ Iowa	♦ Minnesota	♦ New York	♦ Tennessee
♦ Arkansas	♦ Kansas	♦ Mississippi	♦ N. Dakota	♦ Texas
♦ California	♦ Kentucky	♦ Montana	♦ Ohio	♦ Utah
♦ Colorado	♦ Maine	♦ Nebraska	♦ Oklahoma	♦ Washington
♦ Idaho	♦ Maryland	♦ Nevada	♦ Oregon	♦ Wisconsin
♦ Illinois	♦ Massachusetts	♦ New Mexico	♦ Pennsylvania	♦ Wyoming

Local government entities include:

♦ City of Ann Arbor Housing Commission (MI)	♦ City of Marshall (MI)	♦ Great Lakes Bay Michigan Works!
♦ City of Coldwater (MI)	♦ City of Niles (MI)	♦ Town of Clinton (MI)
♦ City of Dearborn (MI)	♦ City of Philadelphia (PA)	♦ Town of Middleborough (MA)
♦ City of Detroit (MI)	♦ City of Sturgis (MI)	♦ Town of Union City (MI)
♦ City of Hillsdale (MI)	♦ City of Tacoma (WA)	♦ Wayne County Airport Authority (MI)
	♦ City of Toledo (OH)	

Utility Commission Experience

Additionally, Mr. Schumaker has performed comprehensive and/or focused performance reviews for regulatory commissions and agencies, including:

Alaska Public Utilities Commission	Maryland Public Service Commission	Oregon Public Utilities Commission
Arizona Corporation Commission	Massachusetts Department of Public Utilities	Pennsylvania Public Utility Commission
Arkansas Public Service Commission	Michigan Public Service Commission	Public Service Commission of Wisconsin
California Public Utilities Commission	Minnesota Public Utilities Commission	Public Utility Commission of Ohio
Colorado Public Utilities Commission	Mississippi Public Service Commission	Public Utility Commission of S. Carolina
Idaho Public Utilities Commission	Montana Public Service Commission	Public Utility Commission of Texas
Illinois Commerce Commission	Nebraska Public Service Commission	Public Service Commission of Utah
Indiana Utility Regulatory Commission	Nevada Public Service Commission	South Dakota Public Utilities Commission
Iowa Utilities Board	New Mexico Public Regulation Commission	Tennessee Regulatory Authority
Kansas Corporation Commission	New Jersey Board of Public Utilities	Tennessee Valley Authority
Kentucky Public Service Commission	New York Public Service Commission	WA Utilities & Transportation Commission
Maine Public Utilities Commission	North Dakota Public Service Commission	Wyoming Public Service Commission

Utility Company Experience

Some of Mr. Schumaker's electric, gas, water/wastewater, and telecommunications assignments are listed below:

Electric Utilities

AEP/Kentucky	General Public Utilities	PECO Energy Company
AEP/Indiana Michigan Power	Georgia Power Company	Pennsylvania Power & Light Company
Alpena Power	GP Energy	Public Service Company of New Mexico
Arizona Public Service Company	Illinois Power Company	Public Service Electric & Gas Company
Arkansas Power & Light Company	Jacksonville Electric Authority	Rockland Electric Company
Central Maine Power Company	Jersey Central Power and Light	Sierra Pacific Power Company
Cleveland Electric Illuminating	Kingsport Power Company	Springfield City Utilities
City of Hillsdale	Long Island Lighting Company	Sunflower Electric Cooperative
City of Niles Utilities Department	Massachusetts Electric Co. (National Grid)	Tacoma Power
Columbus Southern Power Company	Michigan South Central Power Agency	Tennessee Valley Authority
Conectiv	Nantucket Electric Company (National Grid)	Toledo Edison Company
Consumers Energy	Nebraska Public Power district	Union Electric Company
Detroit Edison	New Orleans Public Service	Union Light Heat and Power Company
Duke Energy Indiana	Niagara Mohawk Power Corporation	Upper Peninsula Power Company
Duke Energy Kentucky	Nova Scotia Power Incorporated	United Power Cooperative
Duke Energy Ohio	NSTAR Electric Company	West Texas Utilities
Entergy	Ohio Power Company	Western Massachusetts Electric Company
El Paso Electric Company	Pacific Gas & Electric Company	Wisconsin Electric Power Company
Florida Power and Light Company		

Gas Utilities

Baltimore Gas and Electric Company	Niagara Mohawk Power Company	South Jersey Gas Company
Columbia Gas of Maryland Inc.	Pacific Gas & Electric Company	Southern California Gas Company
Elizabethtown Gas Company (NUI Corp.)	Peoples Natural Gas Company	Union Light Heat and Power Company
Equitable Gas Company (EQT Corp.)	Philadelphia Gas Works	Washington Gas Light Company
National Fuel Gas Distribution Corporation	Public Service Electric & Gas Company	Western Kentucky Gas Company
New Jersey Natural Gas Company		

Water/Wastewater Utilities

General Waterworks Corporation of Pine Bluffs	Tennessee-American Water Company
Kentucky-American Water Company	Toledo Department of Public Utilities
Pennsylvania-American Water Company	United Water New Jersey
Philadelphia Suburban Water Company	Utilities, Inc./Twin Lakes
Philadelphia Water Department	Water Services Corporation of South Carolina

Telecommunications Utilities

ALLTEL Pennsylvania	Illinois Bell Telephone (Ameritech)	Verizon NY
Commonwealth Telephone Company	SBC Ameritech Indiana	Verizon PA
New England Telephone (NYNEX)	US WEST	

Presentations & Articles

- ◆ *User Interface Standards - Reports, Smart Access, March 2002* – This article discussed the standards for creating the various reports used within an application. It discusses standards that can be developed not only for the reports themselves but also the user interface from which the user can choose and customize the reports.
- ◆ *User Interface Standards - Design Development Documentation, Smart Access, April 2002* – This article discussed the various alternatives for creating maintenance forms that are the core to any business application. It discusses standards that can be developed for implementing these forms and presents the code that makes the user interface work.
- ◆ *User Interface Standards, Navigation Smart Access, September 2001* – This article discussed the importance of user interface standards for both programmer and end-user productivity. Using a case study, it presents a discussion of the navigation methods available to an Access programmer and shows how to implement the most useful ones.
- ◆ *User Interface Standards - Implementing Business Process Forms, Smart Access, November 2001* – This article discussed the various alternatives for creating business process forms that are the core to any business application. It discusses standards that can be developed for implementing these forms and presents the code that makes the user interface work.
- ◆ *User Interface Standards - Implementing Application Maintenance Forms, Smart Access, December 2001* – This article discussed the various alternatives for creating application maintenance forms that are the core to any business application. It discusses standards that can be developed for implementing these forms and presents the code that makes the user interface work.
- ◆ *Dose of One's Own Medicine, June 1998* – National Project Management Institute Meeting Presentation: Project management self-assessment and successful implementation of a department's Project Management System.

Technical Exams Successfully Completed

Mr. Schumaker has successfully completed the following Microsoft exams:

- ◆ 220 – Designing Security for a Microsoft Windows 2000 Network
- ◆ 219 – Designing a Microsoft Windows 2000 Directory Services Infrastructure
- ◆ 218 – Managing a Windows 2000 Network Environment
- ◆ 217 – Implementing and Administering a Microsoft® Windows® 2000 Directory Services Infrastructure
- ◆ 216 – Implementing and Administering a Microsoft® Windows® 2000 Network Infrastructure
- ◆ 215 – Installing, Configuring, and Administering Microsoft® Windows® 2000 Server
- ◆ 210 – Installing, Configuring, and Administering Microsoft® Windows® 2000 Professional
- ◆ 087 – Implementing/Supporting Microsoft® Internet Information Server 4.0
- ◆ 076 – Implementing and Supporting Microsoft Exchange Server 5.0
- ◆ 073 – Implementing and Supporting NT™ 4.0 Workstation
- ◆ 068 – Implementing and Supporting NT™ Server 4.0 in the Enterprise
- ◆ 067 – Implementing and Supporting NT™ Server 4.0
- ◆ 059 – Internetworking with Microsoft TCP/IP on Windows NT™ 4.0
- ◆ 058 – Networking Essentials



Consulting Experience

Project Management Experience

Mr. Schumaker is a *Project Management Professional* (PMP®). He has acted as *Engagement Manager, Project Manager, Lead Consultant, or Technical Consultant* on numerous management reviews at the request of both state and local government entities and directly for companies. These assignments involved the implementation of project management techniques into a business or government entity's internal operations. He is a member of the Project Management Institute (PMI) and has also been a presenter at a national PMI meeting. There, he presented the application of PMI methodologies titled *A Dose of One's Own Medicine*, which involved a large utility client providing services in various states. He is also a member of the mid-western Microsoft Project Users Group.

With over 30 years of consulting experience, Mr. Schumaker has been the Project Manager for over 100 different assignments. Over 25 of these assignments involved the review and implementation of project management techniques to a business or government entity's internal operations. These projects included nuclear and fossil power plant projects, electric and gas transmission and distribution projects, water plant and distribution engineering and construction projects, telecommunications installation projects, and research and development projects.

Mr. Schumaker has implemented project management systems (mainframe and minicomputer-based systems) on assignments ranging from large multi-billion dollar nuclear and fossil generation projects to large ongoing software development projects. Project management software systems used include: Microsoft Project, APECS, Project 2, Artemis, Workbench, Primavera, @Risk for Project, and all Microsoft Office applications, including Word, Excel, PowerPoint, Access, Project, and Microsoft Back Office products, including all versions of Windows, Exchange Server, SharePoint, Internet Information Server, SQL Server, Internet Security and Acceleration Server (ISA), and Systems Management Server (SMS).

Utility Management & Operations Audit Experience

Mr. Schumaker has been an *Engagement Manager, Project Manager, Lead Consultant, or Technical Consultant* on more than 50 management and operations reviews. He has also testified before five regulatory commissions. His specific experience in the electric, gas, water, and telecommunications industries includes assignments at over 75 different electric, water, or gas utilities. Sustaining or improving the reliability of aging assets, while minimizing operational, maintenance, and capital costs is vital to every utility company. Also, managing risks (operational, safety, environmental, etc.) and maximizing worker productivity remain key aspects of any business. In order to maintain a solid return on investment from year to year, utility operations must design and implement a plan for managing their assets.

His management audit work has focused on management and operations assessments and performance reviews; business restructuring, business process re-engineering, and process analysis teams; affiliated transactions and cost allocations; customer satisfaction and needs assessments; performance measurement development; and information systems and technology.

Municipal Utility Management and Operations Experience

Mr. Schumaker's evaluation of municipal electric and gas operations includes a review of the organization and staffing of the operations group in relation to its ability to perform its chartered responsibilities in an effective and timely manner. This review investigates work and information flows, staffing levels over time, work order and work assignment procedures, and crew utilization and scheduling techniques.

In particular, Mr. Schumaker has been engaged by municipal power agencies such as the Michigan South Central Power Agency to assist them in various aspects of management and operational changes with the onset of Michigan deregulation and reregulation. Mr. Schumaker provided assistance in performing a competitive assessment and management and operations review of MSCPA and its member municipalities, provided MSCPA branding redesign, customer relationship management program, and customer relations collateral development. Mr. Schumaker has also provided competitive assessment and management and operations assessments of the following municipalities.

City of Detroit, MI
City of Marshall, MI
City of Coldwater, MI
City of Hillsdale, MI
City of Niles Utilities Dept., MI
City of Sturgis, MI

City of Tacoma, WA
City of Toledo, OH
Jacksonville Electric Authority, FL
Michigan South Central Power Agency
Middleborough Gas and Electric Dept., MA
Nebraska Public Power District, NE

Philadelphia Gas Works
Philadelphia Water Dept.
Springfield City Utilities, MO
Town of Clinton, MI
Town of Union City, MI

Electric and Gas Operations Experience

Mr. Schumaker's evaluation of electric and gas operations includes a review of the organization and staffing of the operations group (electric and gas operations and maintenance and electric and gas construction) in relation to its ability to perform its chartered responsibilities in an effective and timely manner. This review investigates work and information flows, staffing levels over time, work order and work assignment procedures, and crew utilization and scheduling techniques.

Evaluating the current practices of a utility, he investigates the use of decision support systems and information technology in the management of the assets (both transmission and distribution) to determine (a) whether the processes used are consistent with currently accepted levels of technology for utility industry in general, (b) whether these processes are properly designed to support the organization in providing superior service to its customers, and (c) whether the utility attempts to tie expenditures to performance levels.

Additionally, he evaluates the engineering design and construction management functions as these are key areas to the efficient and effective operation and construction of the network that is the basis for the provision of reliable service to the customer. The engineering design and planning function must be capable of determining with accuracy the future requirements for service and making the proper provisions for same through the timely conceptualization and design of future facilities.

City of Niles (Michigan) Utilities Dept.	Jersey Central Power & Light	Pennsylvania Gas and Water Company
Columbus Southern Power Company	Kingsport Power Company	Philadelphia Gas Works
Dayton Power & Light Company	Middleborough Gas and Electric Dept.	Public Service Company of New Mexico
Duke Energy Indiana	National Fuel Gas Distribution Corp.	Tacoma Power T&D
Duke Energy Ohio	New Orleans Public Service	Union Light, Heat and Power Company
El Paso Electric Company	PECO Energy Company	West Texas Utilities Company
Equitable Gas Company	Pennsylvania Power & Light Company	Western Kentucky Gas Company

Electric and Gas Reliability Experience

The efficiency and effectiveness of the management of the transmission and distribution assets within an electric utility and the gas distribution system in a gas utility directly translates into the system reliability experienced by the customer. The decision making regarding the management of these assets should incorporate the use of extensive quantitative data available from within the organizational information technology resources. The overall organization of the various functions related to electric and gas distribution should be efficient and effective with clearly defined roles and responsibilities, staffing levels that are workload driven, and adequate consolidation of activities.

Gas reliability is somewhat different than electric reliability in that the primary focus is that of managing overall system risk. Processes need to be in place to repair (replace) system leaks on an ongoing basis such that the leaks do not result in catastrophic failures of the distribution piping. Mr. Schumaker's investigations in the area of gas reliability focus on the decision support tools used to identify gas repair/replacement projects, tools to rank and prioritize these projects for execution, and the subsequent execution of these projects.

Mr. Schumaker's assessment of electric and gas system reliability performance and related operations includes, but is NOT limited to, the following:

- ◆ A review of electric trends as measured by the Customer Average Interruption Duration Index, System Average Interruption Duration Index, System Average Interruption Frequency Index, and Momentary Average Interruption Frequency Index relative to Utility Commission benchmarks and standards, as applicable
- ◆ Testing the electric outage management system data collection process to assess the accuracy of the information being captured in the system
- ◆ A review of service outage causal factor trends and remedial actions to ensure that preventable outages are maintained at reasonable levels
- ◆ A review of electric and gas maintenance activities to determine their overall appropriateness and adherence to internal specifications as well as any applicable regulatory requirements
- ◆ A review of gas infrastructure replacement efforts, in particular related to replacement of unprotected bare steel mains
- ◆ A review of the Company's damage prevention programs including the electronic mapping of electric and gas system facilities, the trend of third-party line hits, and damage recovery efforts



Electric Utilities

AEP/Kentucky	Florida Power and Light Company	Pacific Gas & Electric Company
AEP/Indiana Michigan Power	General Public Utilities	PECO Energy Company
Alpena Power	Georgia Power Company	Pennsylvania Power & Light Company
Arizona Public Service Company	GP Energy	Public Service Electric & Gas Company
Arkansas Power & Light Company	Illinois Power Company	Rockland Electric Company
Central Maine Power Company	Jacksonville Electric Authority	Sierra Pacific Power Company
Cleveland Electric Illuminating	Jersey Central Power and Light	Springfield City Utilities
City of Hillsdale	Kingsport Power Company	Sunflower Electric Cooperative
City of Niles Utilities Department	Long island lighting Company	Tennessee Valley Authority
Columbus Southern Power Company	Massachusetts Electric Co. (National Grid)	Toledo Edison Company
Connecticut	Michigan South Central Power Agency	Union Electric Company
Consumers Energy	Nantucket Electric Co. (National Grid)	Union Light Heat and Power Company
Detroit Edison	Nebraska Public Power district	Upper Peninsula Power Company
Duke Energy Indiana	New Orleans Public Service	United Power Cooperative
Duke Energy Kentucky	Niagara Mohawk Power Company	West Texas Utilities
Duke Energy Ohio	NSTAR Electric Company	Western Massachusetts Electric Co.
Entergy	Ohio Power Company	Wisconsin Electric Power Company
El Paso Electric Company		

Gas Utilities

Baltimore Gas and Electric Company	New Jersey Natural Gas Company	Public Service Electric & Gas Company
Columbia Gas of Maryland Inc.	Niagara Mohawk Power Company	South Jersey Gas Company Western
Elizabethtown Gas Company (NUI Corp.)	Pacific Gas & Electric Company	Southern California Gas Company
Equitable Gas Company (EQT Corp.)	Peoples Natural Gas Company	Union Light Heat and Power Company
Kentucky Gas Company	Philadelphia Gas Works	Washington Gas Light Company
National Fuel Gas Distribution Corporation		

Electric Adjudications Investigation Experience

Mr. Schumaker has assisted with adjudications, investigating the emergency preparation and restoration of service following storms by electric distribution utilities. His inquiry in these matters focused on the electric companies' compliance with performance standards for emergency preparedness and restoration of service, including:

- ◆ Preparation for and management of the restoration efforts with respect to Tropical Storms Irene and snowstorms
- ◆ Allocation of company resources in affected communities
- ◆ Communications with state, municipal, and public safety officials and with the involved Commission
- ◆ Dissemination of timely information to the public
- ◆ Identification of company practices that require improvement, if any

Water/Wastewater Utility Experience

Today, new challenges are making water operations a dynamic and rapidly changing environment, requiring increased interaction between the functional areas, new technologies, expanded capabilities from staff personnel, and for some utilities, re-evaluation of utility philosophies.

In the evaluation of water operations, Mr. Schumaker reviews existing practices and performs a comparison with best practices and relevant benchmarks in the following operational areas:

- ◆ Evaluate the performance of design functions and their ability to communicate with field construction personnel
- ◆ Review planning procedures and make recommendations to create achievable short- and long-term efficiency goals that satisfy missions
- ◆ Review past and current construction projects for performance in planning, scheduling, cost minimization and efficiency
- ◆ Evaluate the accuracy of documentation, response time, and performance of operations and maintenance
- ◆ Assess the systems reliability in providing water that meets the requirements of the Safe Water Drinking Act (SWDA)
- ◆ Evaluate the engineering economics methodology and their ability to coordinate operations in an optimal manner

His analysis determines if the utility's practices promote efficiency and provide their ratepayers with optimal levels of rates and service.

City of Toledo, Department of Public Utilities
General Waterworks Corporation of Pine Bluffs
Kentucky-American Water Company
Pennsylvania-American Water Company
Philadelphia Suburban Water Company

Philadelphia Water Department
Tennessee-American Water Company
United Water New Jersey
Utilities, Inc./Twin Lakes
Water Services Corporation of South Carolina

Telecommunication Operations and Audit Experience

Mr. Schumaker has been an *Engagement Manager, Project Manager, Lead Consultant, or Technical Consultant* on more than 75 management and operations reviews and has testified before multiple regulatory commissions. His specific experience in the telecommunications industry includes assignments at: Illinois Bell Telephone Company for the Illinois Commerce Commission; ALLTEL Pennsylvania, Commonwealth Telephone Company, and Verizon PA for the Pennsylvania Public Utility Commission; New England Telephone Company for the Massachusetts Department of Public Utilities; US WEST (Qwest) for the 14-state steering committee of the Regional Oversight Committee (ROC); SBC Ameritech Indiana following a stipulation and settlement agreement with the Indiana Utility Regulatory Commission and other settling parties; Verizon NY for the New York Public Service Commission, and Michigan State Police (Wireless E911). His telecommunications work focuses on management and operations assessments and performance reviews, telecommunications technologies, business restructuring, re-engineering and process analysis, affiliate relationships and cost allocations, customer satisfaction and needs assessments, performance measurement development, and information systems and technology.

Mr. Schumaker audits measurement categories like Pre-Ordering, Network Performance, Billing, Operator Services and Databases, and General. This includes whether data calculations comply with documentation, and whether stored and reported performance measurement results are accurate reflections of documented methodologies. He reviews processes that affect the accuracy of input data e.g., trouble report disposition codes, service order miss codes, etc. He can then determine what procedures, if any, have been instituted to address diagnostic metrics that do not have related remedy payments and do not meet parity or benchmark standards.

With his prior background in engineering and construction, his experience includes network planning and engineering, outside plant engineering and construction, installation and repair, and customer services (call center operations). He is knowledgeable of current telecommunications technologies including both wire based and wireless technologies. He has investigated the network planning and engineering, outside plant operations, customer services, and installation and repair activities. From a financial or cost allocation basis, his experience includes development of microcomputer-based models for measuring the cost impacts and assessing the impact of affiliate transactions.

He was the co-developer of a microcomputer-based regulatory impact model (RIM) (used on US WEST) that tracks the flow of expenses from non-regulated communications company affiliates through the Federal Communications Commission (FCC) Part 32, Part 64, and Part 36 accounting process. It calculates the impact of affiliate expenses at the regulated intrastate level for state regulatory purposes and can predict the impact due to changes in transaction or regulatory assumptions.

He has also performed Section 271 reviews of Verizon PA processes for performance metric development (pre-ordering, ordering, provisioning, maintenance/repair, network performance, billing, operator services, and general standards) from source system inputs (including operational support systems and manual data input) to where performance reporting occurs.

ALLTEL Pennsylvania
Commonwealth Telephone Company
Illinois Bell Telephone Company
Michigan State Police (Wireless E911)

New England Telephone Company
New York Telephone
SBC Ameritech Indiana

US WEST (Qwest)
Verizon New York
Verizon Pennsylvania

Energy Procurement, Trading, Contracting, and Purchased Power Experience

Mr. Schumaker has performed various assessments of energy procurement (electric and gas) and energy trading and contracting at numerous private and public utilities and agencies. These reviews have included assessment of various electric power supply contracts (purchased power), fuel procurement policies and practices, and energy trading activities. These reviews also included an assessment of generation dispatching and transmission dispatch (tagging) operations. These reviews also included real time, day ahead, and longer term (future) contracting including physical and financial hedging practices.

Mr. Schumaker has been involved in the energy trading activities of numerous different electric companies in both a completely regulated environment and in a deregulated environment. He understands the theories behind economic dispatch and energy trading and has been involved in performing assessment of various aspects of these activities. As an engineer by



training, he not only understands the business aspects of energy trading but also the technical aspects as it relates to the various business models within the industry.

City of Sturgis	Pennsylvania Power & Light Company
Dayton Power & Light Company	PJM
Duke Energy Ohio	Public Service Company of New Mexico
El Paso Electric Company	Sunflower Electric Cooperative
ISO New England	American Electric Power (Ohio Power Company and Columbus Southern Power)
Jersey Central Power & Light	FirstEnergy (Toledo Edison, Ohio Edison, Cleveland Electric Illuminating)
Michigan South Central Power Agency	Union Light, Heat and Power Company (Duke Energy Ohio)
Midwest Independent System Operations	West Texas Utilities Company (now AEP)
New York Independent System Operator	Various utility energy trading and dispatch operations

Fuels and Purchase Power Experience

Mr. Schumaker has over 30 years of business and industry experience in the electric utility industry. This experience includes stints with Bechtel Corporation, which included the design of both nuclear and fossil power plant (including coal power plants), with Theodore Barry and Associates, which included fuel procurement studies for new power plant siting and approvals, and with Schumaker & Company, which has continued to involve activities relating to fuel management. His ongoing fuel procurement activities of power plants have included all the companies listed here.

Most recently, he has completed a fuel and purchased power cost adjustment clause audits of Public Service Company of New Mexico for the New Mexico Public Regulation Commission, Duke Energy Ohio for the Public Utilities Commission, and Dayton Power & Light. He also performed fuel management audits for state regulatory commissions including eight different assignments in the State of Ohio involving FirstEnergy companies Toledo Edison and Cleveland Electric Illuminating; AEP companies Columbus Southern and Ohio Power; Cincinnati Gas and Electric; and Dayton Power and Light. He understands the management and technical issues involving fuels management but also the procedural and administrative issues involved in performing such a review.

Arizona Public Service Company	Nebraska Public Power District – Gerald Gentleman Plant
Arkansas Power and Light facilities	New Orleans Public Services oil-fired facilities
Central Maine Power facilities	Nova Scotia Power Incorporated
Consumers Power and Detroit Edison (DTE) facilities (MI)	Pennsylvania Power and Light facilities
Dayton Power & Light Company	Public Service Company of New Mexico
Duke Energy Ohio	Sierra Pacific facilities
El Paso Electric Company	Springfield City (MO) Utilities with coal sources from Pittsburg (KS)
Georgia Power facilities	TVA facilities (TN)
Illinois Power facilities	Union Light Heat and Power Company (KY)
Jersey Central Power & Light	West Texas Utilities facilities and Central Power and Light facilities

And:

Electricity Supply Board of Ireland (ESB) facilities, including hydro, natural gas, oil, peat, and a new coal-fired plant
FirstEnergy, including Toledo Edison & Cleveland Electric Illuminating (OH); American Electric Power, including Columbus Southern Power and Ohio Power; Cincinnati Gas and Electric; and Dayton Power and Light facilities
Florida Power and Light and Tampa Electric facilities and Jacksonville Electric Authority facilities
Northern State Power (now Excel Energy) and United Power Cooperative (plant located in North Dakota) (MN)
Sunflower Electric Cooperative, a new coal-fired plant siting and fuel supply (KS)

Customer Service Experience

Mr. Schumaker examines the utility's customer service, billing, and collection functions in detail. Among the areas or issues to be addressed in his examination are:

- ◆ The capabilities and effectiveness of customer information and billing systems compared to other electric utilities systems and the training of customer service personnel in system utilization
- ◆ The reasonableness of call center staffing levels and the center's overall performance (e.g., call abandonment rate, percentage of call answered within 30 seconds, etc.) to include validation of telephone access statistics, and a determination of the adequacy of interactive voice response (IVR) equipment and telecommunications technology in general
- ◆ Customer complaint procedures, including a review of their compliance with utility commission dispute handling procedures
- ◆ The trend of consumer complaint rates, justified complaint rates, and complaint response times

ALLTEL Pennsylvania
Central Maine Power Company
Commonwealth Telephone Company
Equitable Gas Company
General Waterworks Corp. of Pine Bluff
Nebraska Public Power District

New Orleans Public Service
Corporation PECO Energy Company
Pennsylvania-American Water Company
Philadelphia Gas Works
Philadelphia Suburban Water Company
Philadelphia Water Department

Tennessee-American Water Company
United Water New Jersey
Verizon New York
Water Services Corp. of South Carolina
Western Kentucky Gas Company

Benchmarking and Analysis Experience

Mr. Schumaker audits the performance metrics that require high-volume transaction processes (service orders and trouble reports) from utility inputs. These measurements include those involving ordering, provisioning, maintenance, and repair. Process service order and trouble report inputs are independently calculated from the results measurements of these inputs. This analysis provides the means to recreate designated performance measurement results for the participating utility and evaluate the accuracy of reported results. The utilities own statistical methods may determine Mr. Schumaker's statistical sampling approaches.

Mr. Schumaker works on the principle that organizations can chart a course to superior economic performance by studying the best business practices, operating tactics, and winning strategies of industry competitive organizations.

As an experienced benchmarking consultant, Mr. Schumaker believes it is important to learn as much as possible before making any direct contact by using desk research including publications and websites etc. This enables him to get a picture of the firm(s) that clients might wish to benchmark and an understanding of what they can bring to the client. From this he develops a shortlist.

Actual data collection from the benchmark can occur in two ways: If it's a one to one exercise then Mr. Schumaker will visit with the organization to understand what it does and how, and; if it's part of a peers/competitors exercise then it will be a data collection process using existing data.

As a result of this experience, all of the information that has been collected over the last ten years has been made available in the *Schumaker & Company Best Practices Knowledge Base*. This is a relational database collection of various pieces of information collected during our projects which have been deemed representative of an industry best practice. Mr. Schumaker has led the development of this computer based repository.

ALLTEL Pennsylvania
Commonwealth Telephone Company
Equitable Gas Company
Philadelphia Suburban Water Company

Philadelphia Water Department
SBC Ameritech Indiana
Verizon New York

Smart Meter Technologies Experience

Mr. Schumaker's AMI-SmartGrid consulting practice area will focus on the selection, deployment, and integration of advanced metering infrastructure (AMI), meter data management (MDM), and demand response (DR) systems and solutions as well as the associated business process redesign required to ensure their effective use.

His relevant experience and familiarity with smartgrid initiatives and their interdependency on the complex interaction of available and emerging automation, communications, and metering technologies assists utility clients to create financial models and develop risk mitigation approaches and strategies to help them manage investment risk, and promote strategies to justify grid modernization investments and solutions.

Mr. Schumaker has been involved in Automatic Meter Reading (AMR) investigations over the last four years. These AMR investigations have included electric, gas, and water companies throughout the United States. As a component of our management and operations review projects, Mr. Schumaker has assessed the results achieved by specific utilities as a result of their implementation of AMR technologies. A sample of his experience includes:

- ◆ CellNet fixed network AMR technologies systems that were initially justified based on a reduction in meter reading costs, and since have had cost savings in other areas eclipse the meter reading cost savings
- ◆ ITRON mobile system meters read on a monthly basis by a contracted firm. Cost savings identified in the initial business case were exceeded in the look back analysis after implementation.
- ◆ ITRON mobile solution meters are read on a monthly basis and due to battery lives not meeting expectations, they are currently undergoing their first battery replacement program.



Review of various implemented AMR technologies within various water operating companies. Follow-up analysis based on the experience on these systems lead to standardized fixed network systems. Implementation of AMR within an operating company was based on a specific business case for that specific operating company. The business cases were developed subject to the business case guidelines promulgated from the company. As a result, whether a fixed or mobile meter reading system was deployed, decisions were based on the total number of customers, meter density, and other parameters for each operating water district.

Equitable Gas Company
Philadelphia Gas Works

PECO Energy Company
Pennsylvania-American Water Company

Business Process Re-engineering and Continuous Improvement Experience

Mr. Schumaker has been *Lead Consultant* on numerous business process reengineering and continuous improvement projects. One of these recently completed assignments was for the State of Michigan Department of Treasury on sales and use tax audits/processing. Another was for the State of Michigan Department of Management & Budget (DMB), Department of Treasury (Treasury), and the Family Independence Agency involving state warrant processing. This project included:

- ◆ Review and assessment of current situation and existing policy, processes, and procedures
- ◆ Findings, conclusions, and recommendations, including identification of alternative technologies for enhancing quality, controls, and efficiency of operations
- ◆ Surveys of other organizations
- ◆ Alternatives analysis
- ◆ Alternatives cost analysis
- ◆ Implementation strategy and plan

The final report recommended certain organizational and business process changes for the printing and handling of state warrants. Warrant processing was transferred to a new organization, composed of individuals from the departments, that was physically located next to the State of Michigan mail center – significantly changing existing business processes, maintaining appropriate fiscal controls, and reducing costs.

He was *Engagement Manager* and *Senior Consultant* for an ongoing re-engineering project at Michigan's Department of Environmental Quality (DEQ) during the implementation of an Electronic Document Management System (EDMS). He led the review and documentation of existing business processes and the creation of a file list, file structure, and indexing for a database of files; established processes and priorities for file conversion; and established processes for electronic imaging of records. The project team, including DEQ personnel, reengineered its records management processes and implemented EDMS in the Storage Tank and Environmental Response divisions. This EDMS uses FileNET for document capture and retrieval and a customized Microsoft SQL database for managing the ongoing file conversion efforts.

Coal Mining Operations Experience

Mr. Schumaker has performed management audits of mining operations as a part of fuel procurement audits and other investigations, including his most recent audit and prudence review of Public Service Company of New Mexico.

Fuel procurement audits of the AEP Ohio Power included a review of both surface mining operations and deep mining operations (long wall mining operations) for mines located in Ohio. Fuel procurement reviews of some of the FirstEnergy companies included captive mining operations.

Investigations at the City of Springfield, Missouri included surface mining operations in Pittsburg, Kansas, and Sunflower Electric Cooperative included surface mining in the Power River Basin, and Nebraska Public Power District included Power River Basin coal sources.

Mine mouth power plant operations have been addressed in Ohio, Texas, Pennsylvania, Kentucky, and North Dakota.

- ◆ Electricity Supply Board of Ireland (ESB) facilities, including hydro, natural gas, oil, peat, and a new coal-fired plant
- ◆ FirstEnergy, including Toledo Edison & Cleveland Electric Illuminating (OH); American Electric Power, including Columbus Southern Power and Ohio Power; Cincinnati Gas and Electric; and Dayton Power and Light facilities
- ◆ Florida Power and Light and Tampa Electric facilities and Jacksonville Electric Authority facilities
- ◆ Nebraska Public Power District – Gerald Gentleman Plant
- ◆ Northern State Power (now Excel Energy) and United Power Cooperative (plant located in North Dakota, MN)

- ◆ Nova Scotia Power Incorporated
- ◆ Pennsylvania Power and Light facilities
- ◆ Public Service Company of New Mexico
- ◆ Springfield City (MO) Utilities with coal sources from Pittsburg, KS
- ◆ Sunflower Electric Cooperative, a new coal-fired plant siting and fuel supply (KS)
- ◆ Union Light Heat and Power Company (KY)
- ◆ West Texas Utilities facilities and Central Power and Light facilities

Contractor Performance Experience

As industry is using more outsourcing and contracting, the controls on and containment of these costs become even more critical. Additionally, it's important that the work that is performed by external vendors is monitored and controlled on a regular basis to ensure that the work is done with quality and in a timely manner. Proper controls and monitoring procedures need to be in place to evaluate the procedures and policies which govern the identification, evaluation, cost justification, and selection of outside contractors and to ensure that contractors are used in an efficient and effective manner.

In Mr. Schumaker's evaluation of the above aspects he reviews contractor management control mechanisms, including the use of nonconformance reporting systems and determines through the use of additional data/information elements, areas that act as inputs to the planning/budgeting process.

Clients have included: Jersey Central Power & Light, AEP Kentucky, and Philadelphia Gas Works.

Corporate Governance Experience

It's all about how structure specifies the distribution of rights and responsibilities among different participants in the corporation, such as, the board of directors, managers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions on corporate affairs. In this area, Mr. Schumaker reviews the Board of Directors composition and function, organization structure and planning, executive compensation, relationships with affiliated interests, management communications and control, and administrative procedures and controls.

Equitable Gas Company

Pennsylvania American Water Company

West Texas Utilities

PECO Energy Company

Philadelphia Gas Works

Western Kentucky Gas Company

Pennsylvania Power and Light Company

Union Light Heat and Power Company

Reliability and Storm Preparedness Experience

Mr. Schumaker has engaged in efforts to assist clients in utility workforce management by reviewing operations and staffing for storm preparedness and response. His energy practice is committed to providing quality methods, tools, and experience to advance the effectiveness of the clients' energy delivery businesses.

Success in today's environment depends on an energy company's ability to proactively address regulator and customer expectations, and provide reliable service at the lowest possible cost. Mr. Schumaker works with clients to ensure the availability of accurate and easily accessible reliability data, establish clear accountability for all process participants, and link financial system information to reliability performance in order to enhance the decision-making process. His integrated reliability strategy services include: strategy development, vegetation management, and implementation of several decision support tools. His efforts include, but are not limited to:

- ◆ Providing extensive analysis of the transformation initiative for electric transmission and distribution operations (including storm preparedness and response).
- ◆ Evaluating distribution automation schemes which affected customers in a local area served by automated loops for improvement in reliability as an attractive investment to supplement other initiatives to improve system-wide reliability.
- ◆ Reviewing various ways in which outage statistics are collected, verified, and reported including implementing computerized outage management systems (OMS) to identify the extent of the outage and predict the location of the problem. An outage report is initiated in two basic ways. The standard method for determining the outage start time is from a customer call reporting the outage. The outage start time is defined as the time of the customer call. Calls are received and outage reports are entered into the OMS. Most utilities in the United States rely on this



method of identifying the outage start time. With automatic meter reading technology, outages are also reported via an AMR system.

- ◆ Assessing how outages are reported, analyzed, dispatched, and closed out.
- ◆ Testing the validity of some SAIFI and CAIDI information being reported using reliability reporting sampling wherein each outage record sampled is verified from the start time of the AMR information, includes the number of customers affected and customer minutes, restore time, number of customers restored, and customer hours with information reported in the outage calendar.
- ◆ Addressing the workforce and manpower planning process, contract versus in-house decision-making, overtime control, productivity, staffing levels, proposed labor saving investments, and reward systems during an audit in the areas of work management, transmission and distribution (including storm preparedness and response).
- ◆ Reviewing existing reliability programs over a previous 12 month period by examining records of actions taken as a result of the analyses from these programs. As a result of these reviews, clients have made changes in their distribution network, including such things as the as the installation of distribution automation schemes, installation of 3-phase and single-phase reclosers, additional animal guards, replacement of equipment determined to be less reliable than newer equipment, reconfiguration of circuits, accelerated vegetation trimming, etc.

Conectiv
Jersey Central Power and Light Company
Kentucky Power Company/AEP

PECO Energy
Public Service Electric & Gas

Rockland Electric
Tacoma Power

Section 11 & Rate Case Verification Experience

Mr. Schumaker has engaged in efforts to assist Commission Staff in verifying that the requirements of Section 11, Public Act No 286 of 2008 were being satisfied for electric utilities in the state. Regulated energy utilities file rate cases with the Commission for approval. The Commission issues an order after reviewing the testimony and exhibits of the utility, interveners, and the Commission Staff. He conducted orientation meetings with Commission Staff, developed a checklist to guide the review for expected rate design, performed spot checks on cost of service study and rate design calculations made, and drafted a report highlighting background and perspective, findings and conclusions, and recommendations.

Alpena Power Company
Consumers Energy
Detroit Edison

Indiana Michigan Power
Northern States Power Company

Wisconsin Electric Power Company
Wisconsin Public Service Corporation
Upper Peninsula Power Company

Nuclear Plant Operations Experience

Mr. Schumaker has been an *Engagement Manager, Project Manager, Lead Consultant, or Technical Consultant* on more than 20 management and operations reviews of nuclear power plant construction and operations and maintenance projects. He began his career as a Mechanical/Nuclear Engineer for Bechtel Power Corporation. He worked in the nuclear group at several nuclear plants in the early stages of design and construction, where he held the position of Nuclear Steam Supply System (NSSS) coordinator. The NSSS consists of the reactor vessel, steam generators, reactor coolant pumps and their associated piping, valves and instrumentation systems. His experience includes both Westinghouse and Babcox and Wilcox NSSS systems. Later, Mr. Schumaker was involved in reviews of nuclear plant construction projects (at such companies as the Tennessee Valley Authority, FirstEnergy, Pacific Gas & Electric, among others) and the operations and maintenance of nuclear plants (at such companies as FirstEnergy – including Three Mile Island, Georgia Power Company, and Entergy, among others).

Clients include: Bechtel Power Corporation and the following Nuclear Plants.

Arkansas Nuclear One
Beaver Valley
Callaway

Clinton
Davis Besse
Diablo Canyon

Hatch
Hope Creek
Nine Mile Point

Palisades Palo Verde
South Texas
Susquehanna

Turkey Point
St. Lucie

Utility Industry Restructuring Experience

Mr. Schumaker has conducted restructuring studies, compliance audits, and code of conduct audits of electric and gas utilities. Their purpose was to ensure that the incumbent utilities or their related competitive business segments do not have an unfair competitive advantage over other, non-affiliated purveyors of competitive services, and to evaluate and review the allocation of costs between competitive and non-competitive services of the utilities. He has offered expert opinion, based on appropriate methodology, as to whether there is strict separation and allocation of each utility's revenues, costs, assets, risks, and functions between the utility's electric and/or gas distribution operations and its related competitive business

segments. In many cases the audits (1) determined whether there is cross subsidization between utility and non-utility segments within a public utility or holding company; (2) whether the separation of utility and non-utility organizations is reasonable based on the state commission's affiliate relation and fair competition standards; (3) the effect on ratepayers of the use of utility assets in the provision of non-safety-related competitive services; (4) the effect on utility workers; (5) the effect of utility practices on the market for such services; and (6) to ensure compliance with legislation. He has given his opinion on whether any other service(s) offered by the utilities was a competitive service. Clients include:

- ◆ Elizabethtown Gas Company, NUI Corporation
- ◆ New Jersey Natural Gas Company, New Jersey Resources Corporation
- ◆ South Jersey Gas Company, South Jersey Industries Corporation

Electronic Document Management Experience

For Michigan's Department of Environmental Quality (DEQ), he was Engagement Manager and Senior Consultant on a project to provide project management and QA services for the implementation of an Electronic Document Management System. The project began with a diagnostic review of the existing situation, identifying issues currently impeding complete implementation, and suggesting a program for moving the project forward. The project team, assisted DEQ personnel, is in the process of reengineering its records management processes and implementing a pilot electronic document management system (EDMS) in the Storage Tank and Environmental Response divisions. This EDMS is using FileNET for document capture and retrieval and a custom Microsoft SQL database for managing the ongoing and backfile conversion efforts. He led the review and documentation of existing business processes for EDMS re-engineering and the creation of a file list, file structure, and indexing for a database of files; established processes and priorities for back file conversion; and established processes for electronic imaging of records. He is now involved in the hands-on implementation of the document management system and several other enhancements to support the Freedom of Information Act (FOIA) process for which the system is designed to streamline among other business process enhancements.

Customer Surveys and Analyses Experience

Mr. Schumaker has designed and conducted several different customer surveys as a part of several different consulting assignments, including, but limited to:

- ◆ A survey to measure customer satisfaction with electric service reliability/quality, clarity of billing, rates, and services.
- ◆ An Electric Service Customer Satisfaction Survey Manual to instruct electric service providers how to administer, comprehend, interpret, and present a survey's results.
- ◆ A survey to measure customers' satisfaction with current levels of services and to identify what other services customers would be interested in obtaining from the client.
- ◆ A customer attitude survey (mail survey to residential and non-residential customers) to identify issues and concerns that needed incorporation in the client's strategic plan.

Clients include: Illinois Commerce Commission, City of Sturgis, Michigan, and the Michigan South Central Power Agency members: Coldwater, Clinton, Hillsdale, Marshall, and Union City.

Information Technology and Systems Experience

Mr. Schumaker has led the development and implementation of information technology plans for companies as large as a multi-billion dollar electric and gas utility, to a small 100-person municipality. These information technology plans have attempted to position an entity to capitalize on the evolving capabilities of modern information technology (hardware and telecommunications), without pursuing a technology that "stalls" the entity – either from a financial or technology perspective.

Mr. Schumaker has been responsible for the overall project management and/or quality assurance of large client/server and web-based systems. He has also directed the technical aspects of both client/server and web technology projects for a variety of clients. This includes the design and development of object-oriented relational database systems for applications as diverse as the Electronic Document Management System for the Michigan Department of Environmental Quality, a physician and provider database for M-Care, a Construction Management System for O'Neal Construction, a CRM/business intelligence system for Holcim, an Auto Wash Billing System for Baltimore Cass Auto Wash, and several internal document tracking systems, time and billing, technology asset management, and project management systems. On the Middleborough project, he developed and implemented an information technology (IT) plan that migrated the municipality to a Windows network with a standard set of office automation software (Microsoft Office), electronic mail, and GroupWare applications.



For O'Neal Construction, he migrated the organization to newer Windows technology environment and recommended and implemented improvements as part of developing a formal IT plan.

He has designed and implemented both Netware and Windows networks for a variety of clients including Schumaker & Company's internal network. He consults on the integration of technologies to solve an entity's business problems, such as the installation and programming of applications for increasing the productivity of an entity's workforce and providing an interface to the Internet for browsing and electronic mail capabilities.

During reviews, Mr. Schumaker interviews information technology managers to identify what controls and design features are in place to limit cross-company access to computer systems and information. He consults on the integration of technologies to solve an entity's business problems, such as the installation and programming of applications for increasing the productivity of an entity's workforce and providing an interface to the Internet for browsing and electronic mail capabilities. He has also directed the technical aspects of both client/server and web technology projects for a variety of clients.

Ann Arbor Housing Commission	Consumers Power Company	O'Neal Construction
Ann Arbor Plastics	Great Lakes Bay Michigan Works!	Wayne County Airport Authority
Baltimore Cass Auto Wash	Kingsport Power Company	Water Services Corp. of S. Carolina
Bosquette & Company	M-Care	Thorondor International
City of Sturgis (MI)	Michigan Department of Environmental Quality	Town of Middleborough (MA)
Commonwealth of Pennsylvania	Middleborough Gas & Electric	

And:

State of Michigan, Department of Treasury, Department of Management & Budget, & Family Independence Agency



Assignment Experience

The following pages contain Mr. Schumaker's relevant client list.

Electric Utility Assignments

<p>Arizona Public Service Company <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Coal costs and plant operations ◆ Gas for electric power production ◆ Nuclear fuel expense ◆ Purchased power expense and sales for resale 	<p>Assisted Arizona Corporation Commission (ACC) with a in the matter of a fuel and purchased power procurement audit of the Arizona Public Service Company, which included an audit of APS fuel clause filings and APS' policies, practices, procedures, rules, accounting practices, and cost allocations, including reports, audits, analyses, and opinions of third party entities, agencies, and auditors who have reviewed relevant aspects of APS's business operations. Focus areas included: coal costs and plant operations, gas for electric power production, nuclear fuel expense, purchased power expense and sales for resale, fuel clause computations, and fuel clause related policies, procedures, rule, cost allocations and manuals.</p>
<p>Duke Energy Kentucky <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Competitive business segment advantage over other, non-affiliated purveyors ◆ Allocation of costs between the utilities' competitive and non-competitive services ◆ Management and operations assessments involving affiliate transactions and cost allocations 	<p>Assisted Duke Energy Kentucky (DEK) with an affiliate management audit in response to the necessity of an affiliate management audit of DEK every two years as ordered by the Kentucky Public Service Commission (KPSC) in Case No. 2005-00228. In 2006, Cinergy Corp., the parent company of Union Light, Heat and Power Company, subsequently re-named Duke Energy Kentucky, merged with Duke Energy Corporation. As part of its approval of the merger, the KPSC established forty-six merger commitments in Case No. 2005-00228, of which three (3), specifically Commitments 11- proper accounting of costs, 12- maintaining appropriate cost allocation procedures and committing to third-party audits, and 13- protecting against cross-subsidization specifically related directly to this audit. Schumaker & Company consultants looked for economies, efficiencies, or improvements to benefit DEK and its ratepayers.</p>
<p>Duke Energy Indiana <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Wholesale and generation operations ◆ Common property ownership with affiliated wholesale power marketers ◆ Name and logo sharing, tying, space/equipment/system sharing ◆ Corporate support to affiliates ◆ Availability of goods and services to (non-)affiliated third parties 	<p>Provided an affiliate standards audit of Duke Energy Indiana (DEI) for the Indiana Office of Utility Consumer Counselor (OUCC). This audit was required by the approved Settlement Agreement in Cause No. 42873 (Settlement) concerning affiliate company transactions, including compliance with the affiliate standards approved in Cause No. 42873, such as the training and controls that DEI has in place to prevent affiliate cross-subsidization. Schumaker & Company consultants focused on key areas and associated deliverables while allowing for more in-depth analysis of those areas that held opportunity for improvements.</p>
<p>Nova Scotia Power Incorporated <i>Engagement Manager & Executive Consultant</i></p> <ul style="list-style-type: none"> ◆ Coal operations ◆ Examination of access control for coal inventory 	<p>Assisted Nova Scotia Power Incorporated (NSPI) in undertaking an audit to examine the solid fuel inventory management function and provide meaningful recommendations for improvement. The review addressed adherence to good utility practice and consistency with the policies and procedures governing fuel management as described in the NSPI Fuel Manual. The scope of the audit included testing the assertions of existence and valuation and an examination of access control for NSPI's coal inventory. The process audited spanned the receipt of the physical inventory through to financial reporting, with a particular focus on adjustments and/or discrepancies between the physical inventory and the inventory records.</p>



Massachusetts Electric Company/Nantucket Electric Company d/b/a National Grid (National Grid), NSTAR Electric Company (NSTAR), Western Massachusetts Electric Company (WMECo)

Project Manager & Lead Consultant

- ◆ Hearing assistance
- ◆ Electric operations
- ◆ Emergency preparation and restoration
- ◆ Emergency response
- ◆ Communications

Provided the Commonwealth of Massachusetts, Department of Public Utilities (DPU) staff on three DPU adjudications investigating the emergency preparation and restoration of service following storms by the electric distribution utilities in Massachusetts, specifically Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid (National Grid), NSTAR Electric Company (NSTAR), and Western Massachusetts Electric Company (WMECo). Our inquiry in these matters focused on the companies' compliance with the DPU's performance standards for emergency preparedness and restoration of service, including:

- ◆ Preparation for and management of the restoration efforts with respect to Tropical Storm Irene and/or the October 2011 Snowstorm
- ◆ Allocation of company resources in the affected communities
- ◆ Communications with state, municipal, and public safety officials and with the DPU
- ◆ Dissemination of timely information to the public
- ◆ Identification of company practices that require improvement, if any

El Paso Electric Company

Engagement Manager & Executive Consultant I

- ◆ Coal costs and plant operations
- ◆ Nuclear fuel expenses
- ◆ Line losses
- ◆ Purchased power expense and sales for resale

Assisted the New Mexico Public Regulation Commission (NMPRC) staff in a prudence review and audit of the fuel and purchased power cost adjustment clause (fuel clause) and related documentation of the electric business operations of El Paso Electric Company (EPE), specifically to provide professional auditing and prudence review services of EPE's fuel and purchased power costs, fuel clause filings and related documentation for the period of January 1, 2010 through December 31, 2010. This review investigated whether EPE's calculation of the fuel clause was accurate and the costs included in the fuel clause included only allowed costs and EPE's current accounting and internal control policies, management practices, and operational procedures, as they pertain to EPE's administration of the fuel clause, were effective and met related requirements.

Jersey Central Power & Light

Project Manager & Executive Consultant I

- ◆ Fuel procurement and purchasing
- ◆ Market conditions
- ◆ Recommendations and review of previous analysis
- ◆ Remediation costs
- ◆ Distribution and operations maintenance
- ◆ Extensions and upgrades to provide regulated services
- ◆ Clean energy
- ◆ Contractor performance

Assisted the New Jersey Board of Public Utilities in an audit of the affiliated transactions between Jersey Central Power and Light (JCP&L) and its affiliates, and a comprehensive management audit of JCP&L. Task areas included an examination of affiliate relationships and cost allocation methodologies, executive management and corporate governance, organization structure, human resources, strategic planning, finance, accounting and property records, cash management, procurement and purchasing of energy, distribution and operation management, extensions and upgrades to provide regulated services, clean energy, market conditions, contractor performance, customer service, external relations, support services, and a review of actions taken by JCP&L regarding prior audits. As part of the audit, Schumaker & Company reviewed and assessed affiliate cost allocation methodologies to determine accounting and allocation procedures for separating the costs of inter-company transactions. Analysis determined if current accounting and allocation procedures were equitable, fair, and did not favor certain affiliates over JCP&L and its ratepayers. Additionally, examination assessed the electric generation policies, distribution policies, and assignment strategies of JCP&L and its affiliates.

Dayton Power & Light Company

Project Manager & Executive Consultant I

- ◆ Fuel procurement procedures and practices
- ◆ Operations and maintenance practices
- ◆ Management performance

Provided fuel cost recovery rider audit co-sourcing assistance to Dayton Power and Light Company (DP&L) to prepare DP&L for its annual review and audit to take place in the first quarter of 2011 for calendar year 2010. Items covered in the scope of work included fuel prices, allocation between wholesale and retail, sharing of gains and losses, coal handling costs, environmental compliance, PJM-related charges, power plant performance, and utility industry perspective.

State of Maine Public Advocate <i>Engagement Manager & Executive Consultant I</i> <ul style="list-style-type: none">◆ Regulatory and reliability merger implications	Provided regulatory and litigation support to the Public Advocate in its intervention in a petition filed on March 18, 2010 at the Maine Public Utilities Commission by Bangor Hydro-Electric Power Company, Maine Public Service Company, Maine Electric Power Company, Inc., and Chester SVC Partnership requesting an approval of reorganization (35-A M.R.S.A. §§ 708 and 1103) financial provisions. Specifically, Schumaker & Company consultants were responsible for analyzing all pertinent data and presenting overall recommendations on the regulatory (including reliability) implications of the proposed merger.
Duke Energy Ohio <i>Engagement Manager & Executive Consultant I</i> <ul style="list-style-type: none">◆ Coal costs and plant operations◆ Power interruptions◆ Midwest ISO charges analysis	Assisted the Public Utilities Commission of Ohio (PUCO) staff in a management/performance and financial audit of the fuel and purchased power and system reliability tracker riders of Duke Energy Ohio, Inc. Specifically, conducted an audit of the company's fuel costs (including any renewable energy costs) plus an audit of system reliability costs. This audit addressed the management/performance and financial aspects of the recovery mechanism. It consisted of a three-year audit cycle (2009-2011) with a complete and thorough audit being conducted in each year of the audit cycle. The initial audit included the actual cost for Rider PTC-FPP and SRT for the months January through December 2009.
Public Service Company of New Mexico <i>Engagement Manager & Executive Consultant I</i> <ul style="list-style-type: none">◆ Coal costs and plant operations◆ Nuclear fuel expenses◆ Line losses◆ Purchased power expense and sales for resale	Assisted the New Mexico Public Regulation Commission (NMPRC) staff in a prudence review and audit of the fuel and purchased power cost adjustment clause (fuel clause) and related documentation of the electric business operations of Public Service Company of New Mexico (PNM). In specific, to provide professional auditing and prudence review services of PNM's fuel and purchased power costs, fuel clause filings and related documentation for the period of June 1, 2008 through June 30, 2009. This review provided documented evidence on the following: <ul style="list-style-type: none">◆ PNM's calculation of the fuel clause is accurate and the costs included in the fuel clause include only allowed costs◆ PNM's current accounting and internal control policies, management practices, and operational procedures as they pertain to PNM's administration of the fuel clause are effective and meet related requirements
New Jersey Board of Public Utilities <i>Jersey Central Power and Light Company</i> <i>GPU Energy</i> <i>Public Service Electric & Gas Company</i> <i>Rockland Electric Company</i> <i>Connectiv</i> <i>Engagement Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Electric system reliability◆ Workforce management◆ Transmission/distribution operations and maintenance	Engaged to assist Board of Public Utility (BPU) staff in reviewing and monitoring the implementation of recommendations resulting from an investigation of New Jersey's electric utilities' system reliability. Assisted BPU staff in the review and investigation of the information supplied by each of New Jersey's four electric utilities, in connection with the implementation of the selected recommendations as ordered by the Board. Particular emphasis was placed on each utility's activities to improve and/or maintain CAIDI and SAIDI indicators at acceptable levels. In particular, issues regarding utilities work force management, electric system distribution planning and engineering practices, transmission and substation maintenance practices and procedures were addressed during our investigations. Worked closely with and at the direction of the BPU staff in reviewing the implementation of the recommendations.
AEP/Kentucky <i>Project Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Asset management◆ Engineering and construction◆ Transmission and distribution operations◆ Vegetation management	Performed an assessment of the reliability of service within AEP/Kentucky's distribution system in its Hazard service territory (a forested mountainous terrain), which has historically experienced a greater number of electric service interruptions than other AEP/Kentucky service areas and, additionally, these interruptions have tended to be longer in duration.



<p>Pennsylvania Power & Light Company <i>Engagement/ Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Executive management and organization ◆ Strategic planning ◆ Power production ◆ Fuels management ◆ Transmission and distribution ◆ Engineering and construction 	<p>Performed a management and operations review of all areas of PP&L's operations. This study included an in-depth investigation of affirmative action/EEO programs; salaries, wages, and benefits; staffing plans and levels; corporate-wide information technology; power plant materials management; nuclear de-commissioning; competitive position of in-house construction and maintenance work forces; and others. Total estimated annual and one-time savings and/or increased efficiency associated with recommendations were in excess of \$70 million (annual) and \$40 million (one-time).</p>
<p>Kingsport Power Company <i>Engagement Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Electric operations and distribution ◆ Executive management and human resources ◆ Cost allocation ◆ Information technology 	<p>Performed a comprehensive management and operations review which focused on executive management and human resources, electric operations (transmission, distribution, and substation) and information technology. Reviewed activities performed at Kingsport Power Company and its affiliate, Appalachian Power Company (in Virginia) and American Electric Power Service Corporation (in Ohio).</p>
<p>PECO Energy Company <i>Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Project planning/scheduling ◆ Data and statistics research and benchmarking analysis ◆ Executive management ◆ Gas supply ◆ Electric/gas operations/reliability ◆ Emergency response ◆ GIS ◆ Corporate governance ◆ Customer service ◆ Shareholder proposals ◆ Merger agreement review 	<p>Performed a stratified management and operations audit of PECO Energy Company (PECO) for the Pennsylvania Public Utility Commission (PaPUC) in with the primary focus areas being PECO, Exelon Energy Delivery (EED), and Exelon Business Services Company (EBSC) functional areas, whose costs are borne ultimately by Pennsylvania ratepayers. Schumaker & Company's diagnostic review of functional areas and in-depth analyses of pre-identified issues (including both electric and gas operations) assessed the condition of each functional area or business unit against evaluative criteria or expected business practice to determine if appropriate management controls, processes, and systems were in place. These analyses were of sufficient depth to provide specific recommendations for changes together with projected costs and potential dollar savings or other quantifiable benefits, if any.</p>
<p>1935 Public Utility Holding Company <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Affiliate relationships and transactions ◆ Cost allocation 	<p>Performed a review of charges associated with the services provided by a services company to its affiliates. The review was to determine whether the services were reasonable, necessary, and non-duplicative and to assess if charges were calculated in compliance with appropriate allocation formulae.</p>
<p>Central Maine Power Company <i>Lead Consultant and Expert Witness</i></p> <ul style="list-style-type: none"> ◆ Organizational structure/management and staffing ◆ Electric operations ◆ Customer service operations ◆ Management efficiency and cost control 	<p>Performed a focused management and operations review evaluating organizational structure/ management/staffing, executive compensation, customer service operations, and management efficiency and cost controls.</p>
<p>West Texas Utilities Company <i>Engagement/ Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Executive management and organization ◆ Electric operations ◆ Power generation 	<p>Performed a management and operations review involving all operations functions and the company's relationship with its parent company, CSW. Investigated the areas of executive management and organization, electric operations, and power generation.</p>

Ohio's Beaver Valley Unit No. 2 <i>Engagement/ Project Manager</i> <ul style="list-style-type: none">♦ Engineering and construction	Reviewed and evaluated studies of construction costs according to the comprehensives of coverage, conformance to Generally Accepted Auditing Standards and Ohio prudence standards, the validity of the findings and conclusions, and the cogency of the supporting documentation. Recommended a course of action for the commission.
PSE&G's Hope Creek Nuclear Plant <i>Engagement/ Project Manager</i> <ul style="list-style-type: none">♦ Analysis of construction costs♦ Cost control systems♦ Construction productivity♦ Project management	Conducted an investigation and analyzed information for rate case preparation. Prepared cost reconciliation that identified reasons for cost overruns. Analyzed project cost and schedule control systems and tools. Recommended cost tracking systems for future construction projects. Reviewed construction productivity and analyzed the effectiveness of productivity programs.
Ohio Power Company Columbus Southern Power Company <i>Engagement/ Project Manager</i> <ul style="list-style-type: none">♦ Fuel procurement♦ Strategic planning♦ Purchasing♦ Marketing	Conducted a review of electric fuel procurement practices and procedures of two AEP subsidiary companies. Analyzed affiliated mines (surface and deep mines) and fuel procurement planning, long-term contracts, and spot procurement. Made recommendations on strategic planning, purchasing policies, and marketing programs.
Wisconsin Electric Power Company's Pleasant Prairie Unit 1 <i>Engagement/ Project Manager and Expert Witness</i> <ul style="list-style-type: none">♦ Analysis of construction costs	Reviewed and evaluated cost overruns and testified in support of findings at rate proceeding. Testimony resulted in a WPSC order to remove \$5 million from WEPCO's rate base request for the Pleasant Prairie project.
The Electricity Supply Board of Ireland <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Fossil fuel procurement♦ System dispatch and power purchase♦ Power plant performance	Performed a focused management and operations that reviewed an examination of electric generation activities. It encompassed fossil (peat, oil, natural gas, and coal) generation and hydro generation in the three generating regions of ESB. Assessed fossil fuel procurement, system dispatch and purchase power, and power plant performance.
Georgia Power Company <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Field station organization♦ Operations and maintenance♦ Power generation	Reviewed power generation and fuels management. Assessed Hatch nuclear generating station organization, operations and maintenance, hydro generation, and several fossil generating stations, including Bowen (3200 Mw).
Nebraska Public Power District <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Engineering and construction♦ Transmission and distribution	Performed a focused management and operations review encompassing all electric generation activities, including fossil engineering and construction, fossil generation, electric transmission and distribution, operations and maintenance, and customer service operations.
New Orleans Public Service Corporation <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Fossil generation♦ Transmission and distribution operations and maintenance	Performed a focused management and operations review that encompassed all electric generation activities, including fossil generation, electric transmission and distribution, operations and maintenance, and customer service operations.



Columbus Southern Power Company
Lead Consultant

- ◆ Engineering and construction
- ◆ Transmission and distribution

Performed a focused management and operations review of electric transmission and distribution as well as engineering and construction.

Union Light, Heat and Power Company
Engagement/Project Manager and Lead Consultant

- ◆ Organization and management
- ◆ Electric and gas operations
- ◆ Strategic and corporate planning
- ◆ Legal services

Conducted a management and operations review of the Kentucky division of Cincinnati Gas & Electric Company. Led the investigation of organization and management, strategic and corporate planning, electric and gas operations, and management and legal services.

Toledo Edison Company
Cleveland Electric Illuminating Company
National Gas and Oil Corporation
Cincinnati Gas and Electric Company
Lead Consultant and Expert Witness

- ◆ Fossil and nuclear fuel procurement
- ◆ System dispatch and power purchase
- ◆ Power plant performance

Conducted performance reviews of the fuel procurement policies and practices. These assessments included fossil and nuclear fuel procurement, system dispatch and purchase power, and power plant performance.

Gas Utility Assignments

Philadelphia Gas Works <i>Project Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Project planning and scheduling◆ Executive management and human resources◆ Corporate governance◆ System reliability and related operations◆ Gas operations/supply◆ Leak detection◆ Emergency preparedness◆ Contractor oversight policies and procedures	Performed a stratified management and operations audit of Philadelphia Gas Works (PGW). The primary focus was the business components of PGW that are subject to regulation by the Pennsylvania Public Utility Commission, specifically any functions supporting PGW service production and delivery, whose costs are borne ultimately by Pennsylvania ratepayers. The objectives included the determination of what improvements, if any, can be accomplished in the management and operations of PGW pursuant to Section 522(b) of the Public Utility Code 66 Ps. C.S. §522(b). Specifically, Schumaker & Company looked for economies, efficiencies, or improvements which benefit PGW and its ratepayers. In doing so, Schumaker & Company identified which economically practical opportunities for cost saving measures could be instituted. This audit consisted of a three-step study process, including a diagnostic review that assessed the condition of each functional area or business unit against evaluative criteria or expected business practice and an in-depth analysis of pre-identified areas or issues.
National Fuel Gas Distribution Corporation <i>Project Manager, Lead, & Principal Consultant</i> <ul style="list-style-type: none">◆ Corporate mission, objectives, goals and planning◆ Performance and results management◆ System planning◆ Energy supply and procurement◆ Load forecasting	Assisted the New York State Department of Public Service (NYSDPS) in a comprehensive management audit of National Fuel Gas Distribution Corporation (NFGDC). The primary focus was the business components of NFGDC's New York gas business with an emphasis on NFGDC's effectiveness in meeting its performance goals and the extent to which there are opportunities for improvement. The objectives included determination of possible improvements for management and operations in areas such as corporate mission, objectives, goals and planning; affiliate relationships and transactions; load forecasting; supply procurement; system planning; capital and O&M budgeting; program and project planning and management; work force management; and performance and results measurement. This audit consisted of a three-step study process, including a diagnostic review that assessed the condition of each functional area or business unit against evaluative criteria or expected business practice and an in-depth analysis of pre-identified areas or issues.
Equitable Gas Company <i>Project Manager & Executive Consultant I</i> <ul style="list-style-type: none">◆ Project planning and scheduling◆ Gas supply and operations◆ System reliability performance and related operations◆ Customer service, billing, and collection functions	Performed a stratified management and operations audit of Equitable Gas Company (EGC), a subsidiary of EQT Corporation, and its relationship with its affiliates. The primary focus of this management and operations audit are the business components of EGC that are still subject to regulation by the Pennsylvania Public Utility Commission, specifically EGC service delivery and production, whose costs are borne ultimately by Pennsylvania ratepayers. The objectives include the determination of what improvements, if any, can be accomplished in the management and operations of EGC pursuant to Section 522(b) of the Public Utility Code 66 Pa. C.S. §522(b). Specifically, Schumaker & Company looked for economies, efficiencies, or improvements which benefit EGC and its ratepayers. In doing so, Schumaker & Company identifies which, if any, economically practical opportunities for cost saving measures and/or better service can be instituted.
Philadelphia Gas Works <i>Project Manager & Executive Consultant I</i> <ul style="list-style-type: none">◆ Project planning and scheduling◆ Gas supply◆ System reliability performance and related operations◆ Customer service, billing, and collection functions	Performed a stratified management and operations audit of Philadelphia Gas Works (PGW). The primary focus of this management and operations audit is to review those PGW business components subject to regulation by the PaPUC, specifically PGW service delivery and production, whose costs are borne ultimately by Pennsylvania ratepayers. Schumaker & Company diagnostic review of functional areas and in-depth analyses of pre-identified issues assess the condition of, efficiencies, or improvements which benefit PGW and its ratepayers. In doing so, Schumaker & Company identified which, if any, economically practical opportunities for cost saving measures can be instituted.



<p>PECO Energy Company <i>Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Project planning/scheduling ◆ Data and statistics research and benchmarking analysis ◆ Executive management ◆ Gas supply ◆ Electric/gas operations/reliability ◆ Emergency response ◆ GIS ◆ Corporate governance ◆ Customer service ◆ Shareholder proposals ◆ Merger agreement review 	<p>Performed a stratified management and operations audit of PECO Energy Company (PECO) for the Pennsylvania Public Utility Commission (PaPUC) in with the primary focus areas being PECO, Exelon Energy Delivery (EED), and Exelon Business Services Company (EBSC) functional areas, whose costs are borne ultimately by Pennsylvania ratepayers. Schumaker & Company's diagnostic review of functional areas and in-depth analyses of pre-identified issues (including both electric and gas operations) assessed the condition of each functional area or business unit against evaluative criteria or expected business practice to determine if appropriate management controls, processes, and systems were in place. These analyses were of sufficient depth to provide specific recommendations for changes together with projected costs and potential dollar savings or other quantifiable benefits, if any.</p>
<p>Elizabethtown Gas Company <i>NUI Corporation</i> New Jersey Natural Gas Company <i>New Jersey Resources Corporation</i> South Jersey Gas Company <i>South Jersey Industries Corporation</i> <i>Engagement Manager & Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Restructuring ◆ Affiliate relations ◆ Competitive services ◆ Code of conduct 	<p>Conducted compliance audits of the competitive services of New Jersey's gas utilities; specifically South Jersey Gas Company (South Jersey Industries Corporation), New Jersey Natural Gas Company (New Jersey Resources Corporation), and Elizabethtown Gas Company (NUI Corporation) as a part of the utility industry restructuring in New Jersey. The purpose of these audits was to ensure that the utilities or their related competitive business segments do not have an unfair competitive advantage over other, non-affiliated purveyors of competitive services, and to evaluate and review the allocation of costs between the utilities' competitive and non-competitive services.</p>
<p>Philadelphia Gas Works <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Evaluation of implementation of earlier management audit 	<p>Performed a follow-up review approximately two years after the completion of a management and operations review, in which he completed the following:</p> <ul style="list-style-type: none"> ◆ Reviewed results of the additional studies recommended during the management audit ◆ Developed a request for proposal for long-term strategic options
<p>Western Kentucky Gas Company <i>Engagement/Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Executive management and organization ◆ Gas operations ◆ Affiliated relationships/transactions 	<p>Performed a management and operations review of all company operations, administrative functions, and relations between WKG and its parent company, ATMOS. Significant emphasis was placed on customer service, gas operations, and organization and management changes following the recent acquisition of WKG by ATMOS.</p>
<p>Philadelphia Gas Works <i>Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Executive management and organization ◆ Gas operations ◆ Customer services and relations 	<p>Performed a management and operations review of this city-owned entity. Investigated executive management and its relations with customers and various political entities. Study was conducted amidst a highly charged (political) environment surrounding all interaction between the Commission and the Gas Works.</p>
<p>Baltimore Gas & Electric Company Columbia of Maryland Inc. Washington Gas Light Company <i>Engagement/Project Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Gas purchasing practices 	<p>Reviewed and evaluated purchasing practices of three natural gas utilities for the Maryland Public Service Commission. In addition, he developed training materials and conducted a training program for commission staff personnel, thereby allowing them to continue the annual review and assessment of the natural gas plans submitted by each company.</p>

Peoples Natural Gas Company <i>Project Manager</i> <ul style="list-style-type: none">◆ Organization and executive management◆ Human resources◆ Corporate planning◆ Legal services◆ Compensation and staffing◆ Allocation of fees	Performed a management and operations review in which he investigated the areas of organization and executive management, human resources, corporate planning, legal services, compensation and staffing, and allocation of fees.
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Southern California Gas Company <i>Lead Consultant</i> <ul style="list-style-type: none">◆ Meter shop operations	Conducted a management and operations review of one of the largest meter shop facilities in the country.
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Water/Wastewater Utility Assignments

<p><i>City of Toledo, Department of Public Utilities</i></p> <p><i>Engagement/ Project Manager & Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Executive & performance management/measurement ◆ Water/wastewater operations ◆ Strategic planning ◆ Customer service, complaints and Inquiries ◆ External relations ◆ Information technology services 	<p>Provided an independent performance audit of the City of Toledo Department of Public Utilities (DPU) for the specific purpose of assessing current operations and proposing improvements in planning and processes to assure that future capital expenditures are made on a timely basis, scheduled maintenance and repairs are done when necessary, appropriate staffing levels are maintained, and best management practices of the industry are incorporated in the DPU's long term plans.</p>
<p><i>Philadelphia Water Department</i></p> <p><i>Engagement/ Project Manager & Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Water and wastewater field operations, workforce, and service levels ◆ Best practices comparison 	<p>Provided a management support study for the Philadelphia Water Department (PWD) customer service and field operations activities to optimize operations, including evaluation of its resource utilization, so as to ensure that it is cost effective, to improve customer service, and to meet its core services and regulatory requirements in a responsible way.</p> <p>In the evaluation of the field operations area, Mr. Schumaker reviewed PWD's existing practices in design functions and their ability to communicate with field construction personnel, planning, past and current construction projects for performance in planning, scheduling, cost minimization and efficiency, accuracy of documentation, response time, and performance of PWD's operations and maintenance, and engineering economics methodology and their ability to coordinate PWD's operations in an optimal manner.</p>
<p><i>Utilities, Inc./Twin Lakes</i></p> <p><i>Engagement/ Project Manager & Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Water and wastewater operations ◆ Customer service and key support units 	<p>Provided a management and operations audit of Twin Lakes utility organization and its affiliate, Water Service Corporation (WSC), on behalf of the Indiana Utility Regulatory Commission (IURC), including operations, customer service/support units, and financial management. The study was organized into three task areas. The first task area was a detailed analysis of the financial management of Twin Lakes Utilities. The second task area was examinations of the water and wastewater utility operations, workforce, and service levels. The third task area comprised key Utilities, Inc. units that support Twin Lakes Utilities, including customer service operations, and included an examination of their operations, workforce, and contribution to the mission of the utilities.</p>
<p><i>Tennessee-American Water Company</i></p> <p><i>Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Affiliate relationships ◆ Management effectiveness and cost competitiveness ◆ Communications and planning 	<p>Performed an affiliate audit of Tennessee-American Water Company (TAWC) at the request of the Tennessee Regulatory Authority (TRA). The audit included an investigation and assessment of the American Water Works Service Company management performance and decisions relating to internal processes and internal controls involving affiliate relationships and transactions, and the resulting recommendations of any management process changes needed for those controls and implementation. Further, the audit evaluated the charges allocated to TAWC, including the efficiency of processes and/or functions performed on behalf of TAWC, as well as the accuracy and reasonableness of the allocation factors utilized.</p>
<p><i>United Water New Jersey</i></p> <p><i>Lead Consultant</i></p>	<p>Performed a comprehensive management audit in which the area of customer services was analyzed, including telephone center operations, credit and collections, meter reading, meter investigators, and the meter</p>

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- ◆ Customer services shop.
 - ◆ Cost allocation



Water Services Corporation of South Carolina

Engagement Manager & Lead Consultant

- ◆ Project planning and scheduling
- ◆ Analytical discipline
- ◆ Planning concepts and practices
- ◆ Organization design
- ◆ Customer service
- ◆ Water operations
- ◆ Pricing strategies
- ◆ Technology tools and training

Performed a management and operations review and assessment of Water Services Corporation (WSC) of South Carolina for the State of South Carolina Office of Regulatory Staff (ORS) with specific focus on the operations of the five subsidiary water and wastewater companies that operate in South Carolina:

- ◆ Carolina Water Service, Inc. (CWS)
- ◆ Tega Cay Water Service, Inc. (TCWS)
- ◆ Utilities Services of South Carolina, Inc. (USSC)
- ◆ Southland Utilities, Inc. (SU)
- ◆ United Utility Companies, Inc. (UUC)

The bottom line of this project was to determine whether the rates charged to the South Carolina ratepayers can be reduced through the implementation of greater efficiencies in organizations, operations, or both. Additionally, another relevant analysis was a determination of whether the ratepayers of South Carolina were being properly and economically served by the range of corporate services that are provided to the WSC operations in South Carolina by the managers located in both West Columbia and Northbrook. Significant consideration was given to investigation of the potential benefits that would result from the consolidation or merger of WSC's affiliated companies.

Pennsylvania-American Water Company

Executive Consultant I

- ◆ Water operations
- ◆ Customer service, billing, and collection functions
- ◆ Operational performance

Performed a stratified management and operations audit of Pennsylvania-American Water Company (PAWC) for the Pennsylvania Public Utility Commission (PaPUC) with the primary focus areas being costs borne ultimately by Pennsylvania ratepayers. Schumaker & Company's diagnostic review of functional areas and in-depth analyses of pre-identified issues assess the condition of each functional area or business unit against evaluative criteria or expected business practice to determine if appropriate management controls, processes, and systems were in place. These analyses are of sufficient depth to provide specific recommendations for changes together with projected costs and potential dollar savings or other quantifiable benefits, if any.

Philadelphia Suburban Water Company

Engagement/Project Manager and Lead Consultant

- ◆ Customer services
- ◆ Engineering and construction
- ◆ Operations and maintenance
- ◆ Cost allocation
- ◆ Capacity planning

Performed a management and operations review of all company functions, giving specific emphasis to staffing and compensation levels, management information systems, allocation of fees from affiliated companies, customer services, engineering and construction, operations and maintenance, water purchase agreements, and capacity planning.

General Waterworks Corporation of Pine Bluff

Engagement/Project Manager and Lead Consultant

- ◆ Affiliated relationships and transaction
- ◆ Water operations
- ◆ Customer service

Performed a management and operations review focused on affiliate relationships, water operations, customer services, and financial management. His final report was submitted as testimony in a general rate hearing of General Waterworks Corporation of Pine Bluffs.

Kentucky-American Water Company

Engagement/Project Manager and Lead Consultant

- ◆ Executive management
- ◆ Corporate planning

Performed a management and operations review of all functions within the company and the relationships with its parent company and affiliates. Investigated the areas of executive management and corporate planning.

Telecommunications Assignments

Verizon New York <i>Project Manager</i> <ul style="list-style-type: none">♦ Organization and management♦ Capital and maintenance planning♦ Customer services and field operations♦ Performance analysis and statistics♦ Best practice comparisons	Analyzed, documented, and verified, through findings based on identifiable and measurable information and data, to ensure that Verizon NY's existing service quality plans and practices of the five VIP service objectives (customer trouble report rate, percent out of service over 24 hours, percent installation completed in five days, PSC complaints, and outliers), NY telephone service standards, and company guidelines meet applicable service quality performance standards, including reasonably foreseeable events and contingencies. Developed and documented recommendations to improve or modify these service quality practices and/or plans where existing plans and practices were not sufficient to ensure that applicable standards were met. Reviewed Verizon NY's processes for service quality performance and its employees, technology, and work processes related to the planning, design, construction, installation, maintenance, repair, and delivery of product to retail customers within Verizon NY's service territory.
Verizon Pennsylvania <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Network performance metrics♦ Performance assurance plan	Performed a review and evaluation of the performance metrics and related remedies of Verizon Pennsylvania, Inc. (Verizon PA), as required by the Pennsylvania Public Utility Commission. Reviewed and evaluated performance metrics for eight different domains, specifically pre-ordering, ordering, provisioning, maintenance and repair, billing, network performance, operator services and general standards. This review and evaluation involved obtaining the source information from Verizon and replicating the information and calculations in a separate data warehouse using various technologies, such as Oracle 8i, SAS, and Microsoft SQL server tools. Developed computer code to represent the C2C performance metrics and worked with Verizon PA and the PaPUC to resolve differences identified.
ALLTEL Pennsylvania <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Customer services♦ Marketing♦ Telephone operations♦ Network planning, engineering, and construction	Performed a stratified management and operations review in which he focused on various functions and activities performed by ALLTEL Pennsylvania, its associated companies (ALLTEL Telephone Service Corporation, ALLTEL Corporate Services, ALLTEL Supply, ALLTEL Publishing), or its parent company (ALLTEL Corporation). Involved heavily in the areas of telephone operations (engineering, construction, and maintenance), regional operations (I&R, Network, etc.), business office and repair center operations, and marketing activities.
SBC Ameritech Indiana <i>Engagement Manager & Lead Consultant</i> <ul style="list-style-type: none">♦ Call center operations♦ Field operations	Performed management and operations analyses of existing practices as part of a focused review of service quality performance and related plans and practices of SBC Ameritech Indiana, including its call center and field operations. Performed a historical review of operations to help identify those causal factors that led up to the service problems that were experienced in the year 2000. Performed computer-based analyses of a wide range of available performance statistics to determine how well specific geographical service areas were performing in relation to the norm for Ameritech Indiana. Further defined the quality of service provision by looking for trends in the underlying operational data of Ameritech Indiana that was linked, directly or indirectly, to the quality of service provided.
Commonwealth Telephone Company <i>Lead Consultant</i> <ul style="list-style-type: none">♦ Customer services♦ Marketing♦ Telephone operations♦ Network planning, engineering,	Performed a stratified management audit involving a diagnostic review of all company operations, followed by an in-depth review of nine pre-identified issues. Involved heavily in the areas of telephone operations (engineering, construction, and maintenance), regional operations (I&R, Network, etc.), business office and repair center operations, and marketing activities. Identified over \$500,000 in annual savings plus other benefits.



and construction

<i>Illinois Bell Telephone Company</i> <i>Lead Consultant</i>	Performed a focused review of the relationship between IBT and its affiliates—Ameritech Corporate, Ameritech Services, Inc., Ameritech Information Systems, Inc., and Bell Communications Research, Inc. (Bellcore)—for the Illinois Commerce Commission. This assessment involved a comprehensive review that particularly focused on IBT's billings to various affiliates and the cost, value, and impact of these affiliate relationships on Illinois ratepayers.
♦ Affiliated relationships and transactions	
<i>U S WEST, Inc.</i> <i>Lead Consultant</i>	Conducted regulatory impact reviews for a Three-State Steering Committee (TSSC) of Arizona, Iowa, and Oregon on behalf of the U S WEST Regional Oversight Committee, which is composed of the 14 states served by U S WEST Communications. Addressed various aspects of the affiliated relationships and transactions between two unregulated U S WEST affiliates—U S WEST, Inc. and U S WEST Advanced Technologies, Inc.—and the impact these transactions had on U S WEST Communications ratepayers.
♦ Affiliated relationships and transactions	
<i>U S WEST Advanced Technologies, Inc.</i>	
<i>Review Director and Lead Consultant</i>	
♦ Affiliated relationships and transactions	
<i>New England Telephone Company</i> <i>Engagement Manager and Lead Consultant</i>	Performed a focused management and operations review involving affiliated transactions and associated allocation methodologies between New England Telephone Company and the major NYNEX affiliates, which include NYNEX Service Company, the NYNEX Corporate organization, and other smaller affiliates. The review also included a critical assessment of such items as cost allocation methodologies, benefits to ratepayers, and cost causal analysis.
♦ Affiliated relationships and transactions	
♦ Service company support of telephone operations	



Municipal Electric and Gas Assignments

<p>City of Tacoma, Department of Public Utilities, Light Division</p> <p><i>Engagement/Project Manager & Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Management and operations ◆ Performance management program ◆ Asset management for engineering, construction & maintenance, and electric service 	<p>Assisted the City of Tacoma, Department of Public Utilities, Light Division (dba Tacoma Power) with a comprehensive review and assessment of Tacoma Power Transmission and Distribution (T&D) Sections' management and operation practices. Schumaker & Company applied an Enterprise Performance Management approach that emphasized the relationship between service levels and costs. The mission of the enterprise was to provide good service at the lowest long-term total cost. Further, every enterprise management team has the responsibility to develop, implement and execute a performance management program that delivers measurable good service at the lowest long-term total cost. The Schumaker & Company approach evaluated the service and cost performances of Tacoma Power's T&D Section and recommended improvements in service levels as appropriate and cost reductions as practical.</p>
<p>City of Sturgis</p> <p>Sturgis, Michigan</p> <p><i>Project Manager and Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Customer survey ◆ Competitive assessment/benchmarking ◆ Electric operations, transmission, and distribution 	<p>Performed a management and operations review, conducted a customer satisfaction and needs assessment, performed a competitive assessment and benchmarking study, and developed a strategic plan. Addressed the changes occurring within the electric utility industry and the competitive threats felt by the city.</p>
<p>Middleborough Gas & Electric Department</p> <p>Middleborough, Massachusetts</p> <p><i>Project Manager and Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Competitive assessment/benchmarking ◆ Management and operations review ◆ Communication with utility board ◆ Electric operations and distribution 	<p>Performed a competitive assessment of this municipal gas and electric department, including a management review of all functional areas and benchmarking of major performance indicators in relation to other Massachusetts municipalities and to the best practices of other public and investor-owned utilities.</p>
<p>City of Coldwater Board of Public Utilities</p> <p>Coldwater, Michigan</p> <p><i>Project Manager and Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Customer satisfaction survey 	<p>Developed, performed, and analyzed the results of a customer survey to assess satisfaction with the city utility services as well as some other city services. Customer survey was a follow-up survey to one that had been conducted two years earlier.</p>
<p>City of Hillsdale Board of Public Utilities</p> <p><i>Engagement Manager and Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Strategic planning 	<p>Developed a strategic plan involving the creation of a mission statement; identification of the organization's strengths, weaknesses, opportunities, and threats; and formulation of long-term goals and objectives in support of the mission.</p>
<p>Michigan South Central Power Agency</p> <p><i>Engagement/Project Manager and Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Customer survey ◆ Competitive assessment/benchmarking ◆ Relationship development – commercial and industrial customers ◆ Communication with boards and councils 	<p>Assisted in the development of a strategic plan for this agency owned by five Michigan municipalities, specifically Coldwater, Clinton, Hillsdale, Marshall and Union City. Addressed the changes occurring within the electric utility industry and the competitive threats being felt by the agency. The effort involved the performance of (1) a competitive assessment/benchmarking of the power agency and (2) a customer attitude survey (mail survey to residential and non-residential customers) to identify issues and concerns that needed incorporation in the strategic plan. The results of these efforts were presented at the agency's annual meeting with customers/owners. Following the strategic plan development, Schumaker & Company was engaged to create, design, and implement a relationship development program involving</p>

the commercial and industrial customers of each municipality.



*City of Niles (Michigan) Utilities
Department*

Engagement/Project Manager and Lead Consultant

- ◆ Management and operations

Performed a management and operations review, which was used to develop a long-term plan for this 55-person utilities department. Identified potential benefits approaching \$250,000 yearly for the electric, water, and wastewater operations, which totaled \$9 million in revenues annually.



Other State Commission Assignments

Michigan Public Service Commission

Project Lead & Senior Consultant

- ◆ Public Act 286 Section 11 verification involving rate cases
- ◆ Multiple electric company reviews

Assisted the Regulated Energy Division of the Michigan Public Service Commission by verifying that the requirements of Section 11, Public Act No. 286 of 2008 are being satisfied beginning with rate case orders issued after January 1, 2009 for each electric utility in the state, including Detroit Edison, Consumers Energy, Upper Peninsula Power Company, Wisconsin Electric Power Company, Alpena Power Company, Indiana Michigan Power, Northern States Power Company, and Wisconsin Public Service Corporation. Regulated energy utilities file rate cases with the Commission for approval. The Commission issues an order after reviewing the testimony and exhibits of the utility, interveners and the Commission staff. Subsection (1) of Section 11 of PA 286 requires the Commission to phase in electric rates equal to the cost of providing service to each customer class over a period of five years from the effective date of this act unless an exception is met. Therefore, for each regulated electric utility with more than one million retail customers (Consumers Energy and Detroit Edison), the MPSC is phasing in electric rates equal to the cost of providing service to each customer class before October 2013. For each regulated electric utility with less than one million retail customers (all others in Michigan), as mentioned in Subsection (2) as an exception, the phase-in period for cost-of-service rates can exceed five years.

Illinois Commerce Commission

Engagement Manager and Senior Consultant

- ◆ Customer satisfaction survey design
- ◆ Training manual in survey implementation
- ◆ Survey implementation training workshops

Designed survey to measure customer satisfaction with electric service reliability/quality, clarity of billing, rates, and services, and provided an Electric Service Customer Satisfaction Survey Manual to instruct electric service providers how to administer the survey and understand, interpret, and present its results.

Arkansas Public Service Commission

Lead Consultant

- ◆ Project management training

Provided training to the APSC staff on how to proceed with the monitoring and control of a management and operations review. Prepared both written and oral reviews of the proposal and detailed work plan from the consultant team. Schumaker & Company also assisted the APSC in managing the review conducted by the outside consultant team.



State and Local Government Assignments

<p><i>State of Washington Whistleblower Program</i></p> <p><i>Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Regulatory compliance ◆ Efficiency and effectiveness 	<p>Assisted the Washington Office of Financial Management (OFM) to perform a performance audit of the Washington State Employee Whistleblower Program (Whistleblower Program) in which focus areas included: whether the program was acquiring, protecting and using its resources such as personnel, property and space economically and efficiently; the cause of inefficiencies or uneconomical practices; whether the program has complied with laws and rules on matters of economy and efficiency; the extent to which the desired results or benefits established by the legislature are being achieved; the effectiveness of the program; whether the staff has complied with significant laws and rules applicable to the program; and the appropriate procedures were in place to ensure confidentiality of the source documents.</p>
<p><i>Great Lakes Bay Michigan Works!</i></p> <p><i>Project Manager Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Information technology 	<p>Assisted GLBMW! by providing information technology (IT) evaluation to provide analysis and recommendations on the GLBMW's IT services; staffing levels, skills, and capabilities; departmental structure; infrastructure and computing resources; metrics and associated performance results, including incorporation of best practices; etc.</p>
<p><i>State of Michigan Department of Treasury</i></p> <p><i>Senior Analyst</i></p> <ul style="list-style-type: none"> ◆ Business process review 	<p>Provided a business process review (BPR) of sales and use tax audits/processing for the Michigan Department of Treasury to provide a higher level of service to Treasury customers and Michigan citizens, while reducing costs and gaining efficiencies. Schumaker & Company reviewed internal Treasury's sales and use tax audit and processing processes in the Tax Compliance Bureau (TCB), and processes in other State departments, which impacted TCB's activities.</p>
<p><i>City of Ann Arbor Housing Commission, Michigan</i></p> <p><i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Operational practices ◆ Technology ◆ Capital needs assessment 	<p>Assisted the Ann Arbor Housing Commission (AAHC) in an operational assessment with an emphasis on financial decisions involving the organization. Specifically, Schumaker & Company performed three key assessments: 1) a high-level analysis of the existing organization structure of services involving major areas of AAHC operations; 2) an evaluation of the present staffing structure for appropriateness, effectiveness, and efficiency of operations; and 3) an assessment of department processes for improved effectiveness and efficiencies with a goal to create an organizational climate of empowerment and accountability. Schumaker & Company identified potential organizational, staffing, and business process changes for consideration by AAHC management. A five-year strategic plan was addressed and a final report written.</p>
<p><i>City of Dearborn, Michigan</i></p> <p><i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Camp Dearborn ◆ MIS Technology Committee 	<p>Assisted the City of Dearborn, who like many organizations, was faced with delivering essential services to its citizens with a reduced level of resources, by performing an assessment of selected units, specifically Camp Dearborn, as a means to streamline and consolidate its operations, eliminate non-essential services, and optimize overall level of resources involved in achieving its goals. Also provided consulting services to the City's Technology Committee regarding a definition of its role in relation to its five subcommittees, to MIS, and to City administration so that problems are efficiently resolved and progress is steady; definition of the role of the five subcommittees; and establishment of a one-year development plan to carry forward the recommendations of a previously-defined Technology Committee report.</p>

<p>Wayne County Airport Authority <i>Project Manager & Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Project planning and scheduling ◆ Analysis/development of project plan, planning concepts/practices ◆ Customer technology and services needs assessment ◆ Technology trends tracking, tools and training ◆ Security vision and strategy 	<p>Provided services to assist the Wayne County Airport Authority (WCAA) Information Technology Division in identifying technology business initiatives and updating its annual performance plan at the Detroit Metropolitan Wayne County Airport. Interviews with key management and staff were crucial to assess customer business needs and identify WCAA's technology initiatives for the next five (5) years, determine if changes are required of the Department of Technology services portfolio in order to continue to effectively and efficiently meet division business needs, determine the impact of current technology and/or airport business trends on the plan, and develop the plan to reflect project deliverables.</p>
<p>State of Michigan Office of Financial and Insurance Regulation <i>Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Organization and management ◆ Measurement tool development 	<p>Conducted an assessment of the State of Michigan, Office of Financial and Insurance Regulation (OFIR), Mortgage Examination and Investigation Section. Interviews and research were conducted to identify and describe characteristics of six state mortgage regulatory programs, including their organizational framework, employee training, and best practices/techniques. Also included was an assessment of the current complaint-based approach versus routine examination approach on a 36/48 month cycle. Quantitative data was identified and captured to develop a tool for OFIR to process the data in measuring the impact of additional staffing in reducing predatory lending practices. Recommended action plans to implement given those findings.</p>
<p>City of Detroit, Michigan <i>Lead Consultant</i></p> <ul style="list-style-type: none"> ◆ Development and analysis of process maps (fire/public works) ◆ Development of findings, conclusions, and recommendations (fire/public works) 	<p>Recommended cost reduction planning and potential revenue enhancement initiatives based on process mapping and analysis of key processes for designated departments (fire and public works, plus potentially reviewing police, transportation, and health/wellness promotion in future months). These plans/initiatives address risks associated with implementation, not only within the designated departments, but especially its potential impact on the delivery of services to the residents and surrounding communities.</p>
<p>State of Michigan Department of State Police <i>Senior Consultant</i></p> <ul style="list-style-type: none"> ◆ Needs assessment ◆ Financial disbursement strategy 	<p>Assisted Michigan State Police (MSP) in developing an objective needs assessment and overall financial disbursement strategy for the specific monies collected under the authority of Public Act 78 of 1999, Section 409(E), specifically the <i>Wireless E911 \$.03 Priority Fund</i>, whose monies were collected over a two-year timeframe. Assisted in developing a strategy for disbursement of these monies to provide appropriate funding for identified and needed services, initiatives, and products; developed criteria for selection and evaluated proposals from the public safety answer point (PSAP) community for disbursement of funds; and recommended proposals for consideration by the Michigan Legislature.</p>
<p>State of Michigan Department of Environmental Quality, Air Quality Division <i>Project Manager</i></p> <ul style="list-style-type: none"> ◆ Joint applications design sessions ◆ Scope statement ◆ Estimate package ◆ Project planning and scheduling ◆ Cost/benefit analysis ◆ Risk management plan ◆ Process and systems improvements design 	<p>Performed a thorough and comprehensive assessment of existing systems and processes. Existing processes were inefficient and existing systems needed significant improvement. Delivered a comprehensive business process re-engineering strategy and a high-level project plan for systems redesign efforts. By working closely with Air Quality Division staff and understanding their needs, outlined process improvements, scoped system improvements, and delivered a strategy that exceeded expectations. Estimate package developed included the following:</p> <ul style="list-style-type: none"> ◆ Outline existing business processes ◆ Recommended business process improvements ◆ Risk management plan ◆ Cost/benefit analysis ◆ Work breakdown structure ◆ High-level project plan, schedule, costs, and design for MAERS enhancement ◆ High-level project plan, schedule, costs, and design for EI Toolkit enhancement ◆ High-level system integration plan, schedule, and costs ◆ Recommendations for improvements and possible alternative solutions



State of Michigan
Department of Environmental Quality
Project Manager & Lead Consultant

- ◆ Records management reengineering
- ◆ File structure and indexing
- ◆ Imaging

Provided project management and QA services for the implementation of an electronic document management system (EDMS). The project began with a diagnostic review of the existing situation, identifying issues currently impeding complete implementation, and suggesting a program for moving the project forward. The project team, assisted by DEQ personnel, is in the process of reengineering its records management processes and implementing a pilot EDMS in the Storage Tank and Environmental Response divisions. The EDMS is using FileNET for document capture and retrieval and a custom Microsoft SQL database for managing the ongoing and backfile conversion efforts. Mr. Schumaker led the review and documentation of existing business processes for EDMS re-engineering and the creation of a file list, file structure, and indexing for a database of files; established processes and priorities for back file conversion; and established processes for electronic imaging of records. He is now involved in the hands-on implementation of the document management system and several other enhancements to support the Freedom of Information Act (FOIA) process for which the system is designed to streamline other business process enhancements.

State of Michigan
Department of Treasury
Department of Management & Budget
Family Independence Agency
Senior Consultant

- ◆ Warrant processing work flows
- ◆ Technology strategy and implementation
- ◆ Benchmarking organizations, both private and public sector, performing similar activities

Performed a study of the existing work processes and systems for printing and disbursing State of Michigan warrants, resulting in the following:

- ◆ Review and assessment of the current situation and existing policy, processes, and procedures
- ◆ Findings, conclusions, and recommendations, including identification of alternative technologies for enhancing quality, controls, and efficiency of operations
- ◆ Surveys of other organizations
- ◆ Alternatives/cost analysis
- ◆ Implementation strategy and plan

Information Technology Assignments

Ameri-serv Group <i>Project Manager</i> <ul style="list-style-type: none">◆ Project management◆ Software design and development	Performed a customer relationship management (CRM) systems review for this small service firm. Developed a disaster recovery plan for the older existing systems and began to develop and implement a migration plan for rewriting the application in .NET and Microsoft SQL Server. Technologies used: Microsoft .NET and SQL Server
Baltimore Cass Auto Wash <i>Project Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Software design, development, and implementation	Designed, developed, implemented, and supported a billing and accounts receivable application. This application summarizes and tracks charges incurred by Auto Wash customers (such as Detroit Edison, the City of Detroit and other major companies) who have standing contracts for their services. The application supports the monthly billing and accounts receivable process. This application replaced an earlier application written in software that was no longer supported. This application permitted the company to continue their current operations.
M-CARE <i>Project Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Software design, development, and implementation	<p>Designed, developed, implemented, and supported a participating provider database application for M-CARE, the health management organization designed by the University of Michigan. This application allows M-CARE staff and providers to maintain up-to-the-minute information about participating providers, including location and specialization, for M-CARE participants. The application provides management information that is printed and distributed to M-CARE providers as quarterly provider directories.</p> <p>This application has been in use for over three years, and the client saw a return on the investment on this application in less than one year. In addition, personnel resources that had been previously devoted to this effort were reduced by two full-time equivalents, and an even greater cost savings has been achieved by making this information available on the Internet and significantly reducing the publication of paper directories.</p>
Middleborough Gas & Electric Department <i>Middleborough, Massachusetts</i> <i>Project Manager and Senior Consultant</i> <ul style="list-style-type: none">◆ Network design and installation	Developed and implemented an information technology (IT) plan that migrated Middleborough to a Windows NT network with a standard set of office automation software (Microsoft Office), electronic mail, and groupware applications. This migration included the installation of a new server and new workstations (a standardized workstation) and the implementation of a WAN using the municipality's electric distribution system facilities.
O'Neal Construction <i>Project Manager & Lead Consultant</i> <ul style="list-style-type: none">◆ Technology design and implementation◆ Software design, development, and implementation	<p>Originally engaged to correct technical problems associated with a Netware to Windows NT migration by another vendor, Schumaker & Company performed as the IT department for O'Neal Construction. Numerous security and configuration issues were addressed in the original migration. Assisted in IT improvements, including workstation hardware and software upgrades, reconfiguring of Windows NT server, implementation of Exchange mail system, and enhancing Internet access capabilities. Recommended to management and implemented the migration to a new server and all new workstations to meet performance needs of the users. Provided ongoing network support.</p> <p>Also designed and developed a construction cost projection model to develop cost projections on individual projects using ODBC connector to access historical construction costs for O'Neal's FOREFRONT accounting system (a Btrieve database) on a real time basis. The application used OLE to populate the information into an Access database for further analysis and presentation. It permits O'Neal Construction project managers to create real time costs projections throughout the construction project.</p>



Thorondor International Senior Consultant	<p>Provided ongoing support of network support, as well as assistance with IT improvements, including workstation hardware and software upgrades, reconfiguring of Windows NT Server, Windows NT Workstation and Windows 98 workstations implementation of Exchange mail system, and enhancing Internet access capabilities.</p>
<ul style="list-style-type: none"> ◆ Technology design and implementation ◆ Software design, development, and implementation 	
Ann Arbor Plastics Ann Arbor, Michigan	<p>For this Michigan-based manufacturer of plastic display units, Schumaker & Company performed a business process reengineering project to identify potential opportunities for improvements in the flow of information and paperwork in the materials management and order entry/fulfillment processes. Detailed flowcharts of the two existing business process flows were developed. Analysis of these flowcharts, in conjunction with company management, revealed numerous potential areas for improvement. Formulated a listing of recommendations to take advantage of opportunities for improvement. Implementation of these recommendations by management resulted in significant gains in the efficiency and cost effectiveness of the overall business process. As a result of this, Schumaker & Company was contracted to assist the company in the identification of an ERP system that would better meet the needs of Ann Arbor Plastics, especially in regard to the ability to support projected future growth. This ERP requirements definition and selection/implementation project is currently in process.</p>
<ul style="list-style-type: none"> ◆ ERP system selection ◆ Business process reengineering 	
Bosquette & Company Network Consultant	<p>Upgraded the Novell 3.2 OS to Novell 4.2, overseeing and maintaining the Novell 4.11 50-user network with two remote locations connected via point-to-point fractional T1 to a Citrix Winframe 1.7 server (NT 3.51 platform). Recommended network upgrades, ordering equipment, configuring, and installing workstations (Win95 & Win98) to operate properly for TCP/IP sDSL connection to Internet, and WinTam software. Additionally, acted as the primary point of contact for utilities, performed troubleshooting and training on our Applied Systems-WinTam & DosTam v.6.03 software; general MS Office training; general Internet Browsing and Email training; and general maintenance and management of the Comdial telephone, Konica & Pitney Bowes fax, HP IIIsi, 5si, 4P, and various InkJet & Office Jet printers, in addition to Konica printer/copier troubleshooting and training.</p>
<ul style="list-style-type: none"> ◆ Technology design and implementation ◆ Network support 	
Consumers Power Company Project Manager and Lead Consultant	<p>Investigated new business opportunities for the Information Systems Department. Identified several opportunities, but advised client not to pursue due to resource requirements and lack of competitive advantage.</p>
<ul style="list-style-type: none"> ◆ Service bureau analysis ◆ Information technology 	
Consumers Power Company Project Manager and Lead Consultant	<p>Coordinated the implementation of a formalized information systems planning process, which became the fundamental planning process governing the company's hardware, software, telecommunications, and office automation expenditures. Assignment involved holding briefings with upper management, establishing a systems planning organization, developing specific systems planning activities and schedules, and defining the content of the systems plan document.</p>
<ul style="list-style-type: none"> ◆ IT systems planning ◆ Information technology 	
Consumers Power Company Project Manager and Lead Consultant	<p>Assisted in developing of a long-range plan for meeting information and computer system needs of the energy supply. The plan identified two major system needs: 1) a new power plant maintenance management system and 2) a nuclear plant admittance system. The utility subsequently developed and is marketing to other utilities in addition to in-house use. The study also resulted in several smaller system and procedural improvements.</p>
<ul style="list-style-type: none"> ◆ Information technology planning 	

Consumers Power Company

Project Manager and Lead Consultant

- ◆ Information technology planning

Developed long-range information technology plan for the nuclear department. In addition, conducted a separate investigation of the use of outside computer resources for nuclear processing. The decision was made to continue using the outside services for processing; however, the same methodology was applied three years later to warrant moving the processing in-house, which resulted in more than \$250,000 in annual savings.

Internal Schumaker & Company Projects

Project Manager & Lead Consultant

- ◆ Systems design, development, and implementation

Provided project management services for Schumaker & Company's internal Visual Basic/SQL Server applications tailored to consulting business needs, including:

- ◆ *TEIRS* – A time and expense tracking system that can organize information by client, project, deliverable and staff person for project management and invoicing purposes.
- ◆ *Information Media & Records Management System Database* – A records management system that catalogs all information stored in office bookcases and file cabinets in a readily retrievable form.
- ◆ *PMLA* – A project management documentation system that implements the project management principles contained in the Project Management Institute's Project Management Body of Knowledge.
- ◆ *QMS* – An application that facilitates quality management by tracking issues, actions, change orders, defects, etc., for large projects.
- ◆ *IT Database* – An application that facilitates the tracking of available hardware and software within an organization.
- ◆ *Contact Manager Mailing DB and Lead Management DB* – Mailing databases for managing prospective clients and generating mailing lists.
- ◆ *KeyInfo* – A database for managing and storing important personal information, including online account information, credit card information, membership information such as frequent flyer and diner accounts, etc., and other pertinent data.
- ◆ *Media Collection DB* – A database for organizing and maintaining information on various media (CDs, DVDs, and Video)



References

References are provided in the following tables.

State Agency/Other	Project List	Project Dates	References
New York Public Service Commission Three Empire State Plaza Albany, NY 12223-1350	National Fuel Gas Distribution Corporation	JUNE 2012 – MAY 2013	Mr. Jeremy Routhier-James, NYSDPS (518) 473-8149 Jeremy.RouthierJames@dps.ny.gov
New Mexico Public Regulation Commission 1120 Paseo De Peralto (P.E.R.A. Building) Santa Fe, NM 87504	El Paso Electric Company	OCT 2010 – APR 2011	Mr. Marc Martinez, Utility Economist (505) 827-5858 Marc.Martinez1@state.nm.us
	Public Service Company of New Mexico	JULY 2009 – FEB 2010	Mr. Marc Martinez, Utility Economist (505) 827-5858 Marc.Martinez1@state.nm.us
Dayton Power & Light Company 1065 Woodman Drive Dayton, OH 45432	Fuel cost recovery rider audit	JUN – AUG 2010	Ms. Judy Baker, DPL Director, Internal Audit (937) 259-7905 judy.baker@dplinc.com
New Jersey Board of Public Utilities 44 South Clinton, 9th Floor Trenton, NJ 08625-0350	Jersey Central Power & Light Company	JUN 2010 – JUN 2011	Mr. Art Gallin 609-292-1664 Arthur.Gallin@bpu.state.nj.us Mr. Gary Schmidt Gary.Schmidt@bpu.state.nj.us
	Jersey Central Power & Light Company/GPU Energy Public Service Electric & Gas Company Rockland Electric Company Conectiv	NOV 2000 – APR 2001	Mr. Chris Molnar (973) 648-7690 molner@bpu.state.nj.us
	South Jersey Gas Company New Jersey Natural Gas Company Elizabethtown Gas Company	JUL 2000 – OCT 2000	Mr. Jim Rekulak (973) 648-4516 rekulak@bpu.state.nj.us
	United Water New Jersey	APR 1996 – AUG 1996	Mr. Jim Rekulak (973) 648-4516 rekulak@bpu.state.nj.us
Public Utilities Commission of Ohio 180 East Broad Street Columbus, OH 43215-3793	Duke Energy Ohio, Inc.	JAN 2010 – MAY 2010 (Follow-up in three subsequent years)	Ms. Tamara Turkenton (614) 466-1825 tammy.turkenton@puc.state.oh.us
Tennessee Regulatory Authority 460 James Robertson Parkway Nashville, TN 37243-0505	Tennessee-American Water Company	FEB – JULY 2010	Mr. Richard Collier, Attorney (615) 741-3191 x 170 Richard.Collier@tn.gov
	Kingsport Power Company	FEB – SEP 1996	Mr. William H. Novak (WHN Consulting, formerly Atlanta Gas Light Company and TRA) (713) 298-1760 hlnovak@whnconsulting.com

State Agency/Other	Project List	Project Dates	References
Pennsylvania Public Utility Commission 400 Third Street Commonwealth Keystone Bldg. Harrisburg, PA 17105-3265	Philadelphia Gas Works	OCT 2007 – DEC 2008	Mr. John Clista, Management Audit (717) 772-0317 jclista@state.pa.us
	Pennsylvania-American Water Company	JUL 2008 – AUG 2008	Mr. John Clista, Management Audit (717) 772-0317 jclista@state.pa.us
	PECO Energy Company	JUN 2006 – AUG 2007	Mr. John Clista, Management Audit (717) 772-0317 jclista@state.pa.us
	Verizon PA	MAY 2003 – SEP 2003	Mr. Louis Mazza, Project Officer (717) 772-0300 lomazza@state.pa.us
	Pennsylvania Power & Light Company	FEB 1993 – JUN 1994	Mr. Dennis Hosler (717) 783-5000
	Philadelphia Suburban Water Company	SEP 1989 – SEP 1990	Mr. Allen Gardocky
Kentucky Public Service Commission 211 Sower Blvd. Frankfort, KY 40601	AEP Kentucky	AUG 2002 – FEB 2003	Mr. John Rogness (502) 564-3940 jrogness@mail.state.ky.us
	Kentucky-American Water Company	NOV 1990 – JUN 1991	Mr. Aaron Greenwell (502) 564-3940 adgreenwel@mail.state.ky.us
	Western Kentucky Gas Company	APR 1989 – DEC 1989	Mr. Aaron Greenwell (502) 564-3940 adgreenwel@mail.state.ky.us
	Union Light Heat and Power Company	OCT 1988 – AUG 1989	Mr. Aaron Greenwell (502) 564-3940 adgreenwel@mail.state.ky.us
New York Public Service Commission Three Empire Plaza Albany, NY 12223-1350	Verizon New York	OCT 2003 – SEP 2004	Mr. John Coleman, Service Quality Audit Project Manager (581) 486-2947 john_coleman@dps.state.ny.us
SBC Ameritech Indiana 240 North Meridian St. Indianapolis, IN 46204	SBC Ameritech Indiana & Settling Parties	FEB 2002 – SEP 2002	Ms. Bonnie Simmons, Attorney (317) 265-3676 bs7879@sbc.com

